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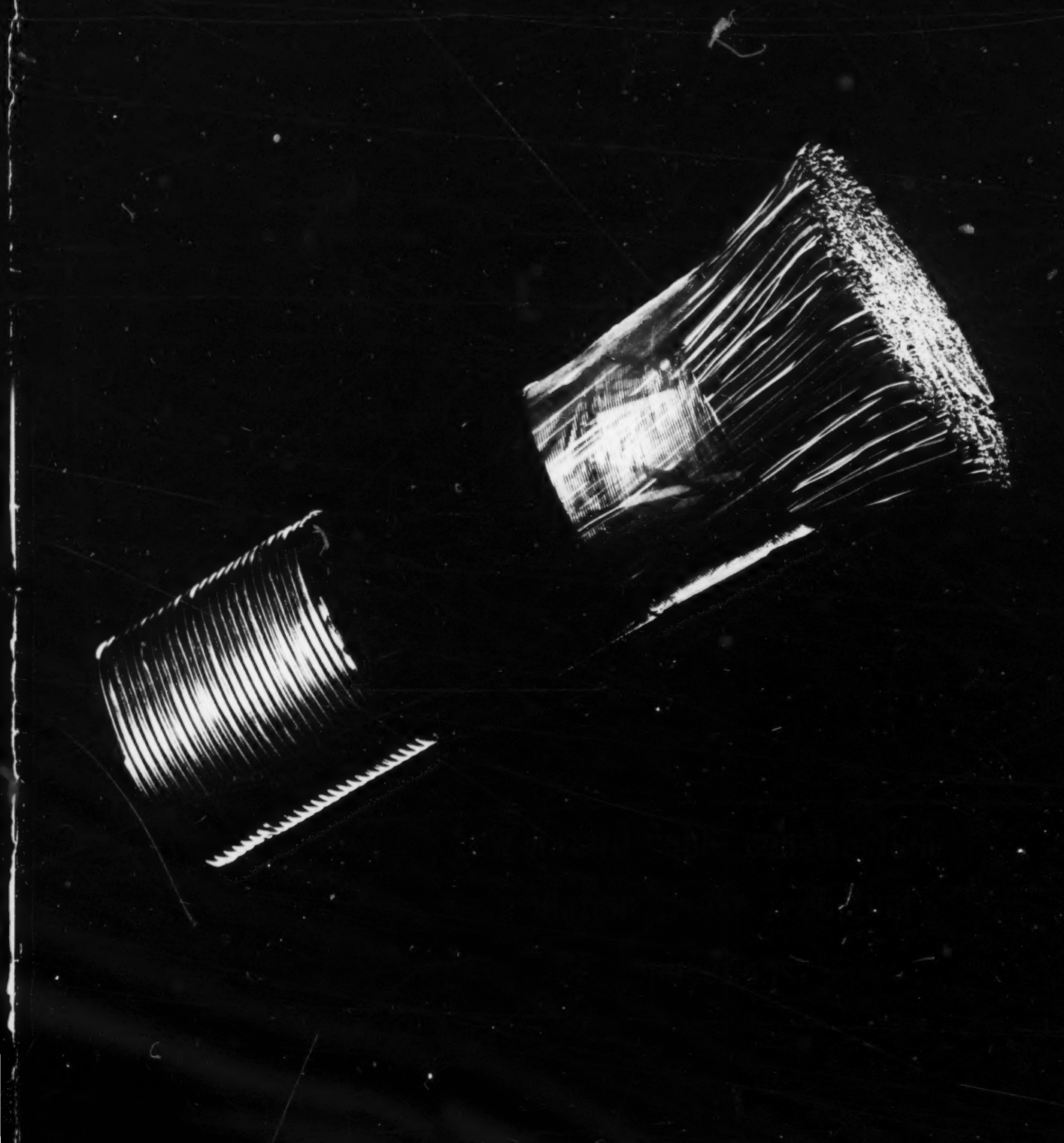
RubberWorld

The technical service magazine for the rubber industry Volume 195, No. 2 November 1986



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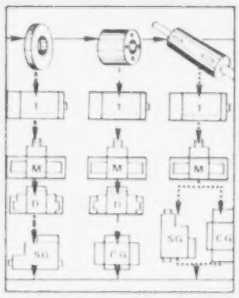

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6 Business Briefs
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14 Tech Service: A 300° urethane?
by Jon Menough, contributing technical service editor. A look at a new millable urethane capable of handling heat of 300° F for use in mechanical goods.

16 Quality Management: The seven deadly sins
by David Crosby, Crosby & Co. Sins four and five are discussed covering unawareness and dealing with suppliers.

18 Urethane Forum: Bonding polyurethane . . . the new application
by Bill Stahr, Brad & Associates. A look at how to develop a new bonded part.

21 New approaches to low hazard cable construction
by Morton Brown and Upen I. Vaidya, Du Pont Co. Authors discuss development of cable constructions that will provide flame retardancy and low smoke evolution, particularly with copolymers of ethylene and vinyl acetate or acrylic esters compounded with hydrous minerai fillers.

26 Smoke reduction for wire and cable insulation containing halogenated additives
by James J. Duffy and Charles S. Ilardo, Occidental Chemical Corp. Article describes the development of formulations which will allow traditional halogenated materials to be used in wire and cable applications where reduced smoke during combustion is needed.

31 GT — application in the rubber industry
by Robert Miller, Brigham Young University. Author discusses Group Technology, a manufacturing strategy that identifies similar attributes in products and classifies them for optimum productivity.

44 Patent News
edited by Bob Samples, Akron Rubber Development

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by David Given, technical editor

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Cover

Cover courtesy of Davis-Standard

A Lippincott & Peto Publication

Business Briefs

Essex Chemical acquired **Union Plastics, Inc.** Kennedale, TX, a producer of custom rotationally molded plastics products.

Du Pont has purchased an option to acquire **ETD Technology Inc.**, Shoreview, MN, a systems supplier of specialty chemicals and control processes for electroplating printed wiring boards. During the option period, Du Pont has acquired the rights to sell ETD's chemistry and control systems outside the U.S.

Jones & Vining signed a letter of intent to acquire **Bata Industries'** Cimtech division which develops and markets worldwide CAD/CAM equipment for footwear design.

A multi-million dollar expansion program at **Engelhard Corp.'s** McIntyre, GA facility will increase calcined capacity and that of ancillary equipment used to manufacture the company's calcined extender pigments.

Contracts, licenses

Olde Yorke Rubber Co. was merged into **Jonathan Rubber Corp.**, a subsidiary of Valvic, Inc., of Three Bridges, NJ. The merged companies are manufacturing fabricated molded rubber items at a plant in Garrett, IN.

3M's Tartan Tooling Products and the computer aided engineering division of **Application Engineering** agreed to jointly market their two technologies to molders and moldmakers. 3M provides molded-in-place cooling channels and AE computerized mold-cooling analysis.

Through an agreement with **Du Pont, Goodyear** will increase its capability to supply polyester resin. The resin will be produced using a combination of proprietary Goodyear and Du Pont technologies at Du Pont's Old Hickory, TN facility with further processing performed at Goodyear's Point Pleasant, WV or Scottsboro, AL plants.

E.C.C. Americas merged with **Moretti-Harrah Marble Co.**, known in the industry as Sylacauga Calcium Products.

Financial statements

BFGoodrich reported net income of $16.6 million in the third quarter on sales of $574.1 million.

Carlisle Companies Inc. had third quarter net earnings of $4.9 million on sales of $115.3 million.

Cooper Tire reported net earnings for the third quarter of $7.2 million with sales of $165.7 million

Goodyear's net income for the third quarter was $182.3 million on sales of $2.6 billion.

Lubrizol Corp. announced that consolidated revenues for the third quarter were $232.8 million with net income of $17.7 million.

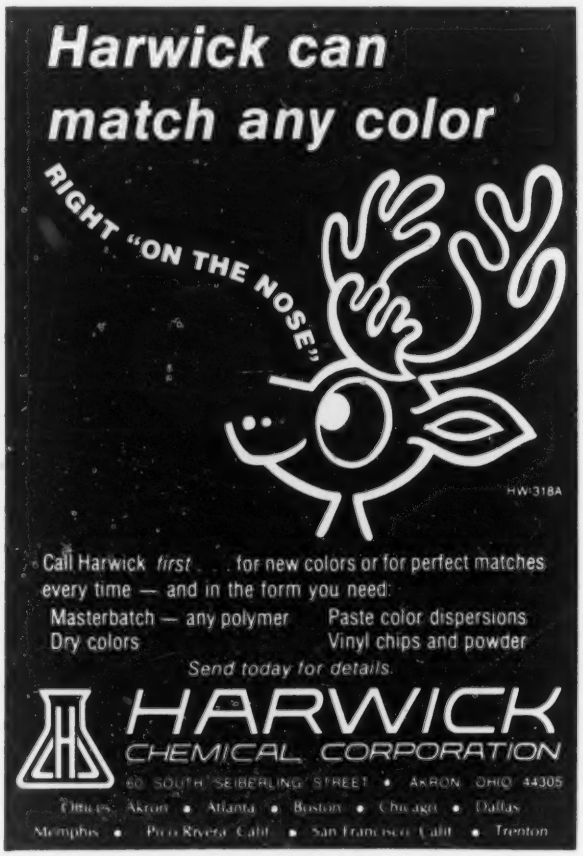
Parker Hannifin had a first quarter of 1987 net income of $18.9 million on sales of $444.3 million.

Rheometrics reported 1986 annual sales of $16.5 million with net earnings of $851,000.

Rubbermaid reported third quarter net earnings

RMA tire report through August 1986 (figures in thousands of units)

Passenger tires	YTD 1986	YTD 1985	%change
Shipments			
Original equipment	36,630	37,037	-1.10
Radial	30,770	30,839	-0.22
Replacement	94,498	92,141	2.56
Radial	81,239	73,870	10.10
Export	2,529	3,438	-26.63
Radial	1,919	2,727	-29.63
Total	133,657	132,616	0.78
Radial	114,018	107,436	6.13
Production	104,867	110,396	-5.01
Radial	88,621	87,812	0.92
Truck & bus tires			
Shipments			
Original equipment	4,643	5,210	-10.88
Radial	3,087	3,260	-5.31
Replacement	20,801	20,806	-0.02
Radial	9,876	8,842	11.69
Export	868	892	-2.69
Radial	531	451	15.18
Total	26,312	26,908	-2.21
Radial	13,494	12,563	7.41
Production	20,374	23,073	-11.70
Radial	9,847	10,150	-2.99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were $19.6 million on sales of $216 million.

Standard Products had first quarter sales of $102.4 million with earnings of $6.3 million.

Markets, news

A report by J.M. Huber says that the carbon black trade balance for the first seven months of this year improved sharply over the same period of 1985. The year-to-date balance is a negative 14 million pounds, compared for 1985's figure of -44 million pounds. For the year, imports are expected to exceed exports by 45-50 million pounds according to the report, a substantial improvement over the 1984 figure of 81 million pounds and last year's 74 million pound deficit.

Canada and Mexico are the dominant sources of imported black. The trade balance with all other countries is on the plus side, however this margin has deteriorated by over 60% in the past six years. The U.S. became a net importer of carbon black in 1984 when combined imports from Canada and Mexico increased by 50% over the volume in 1983. The report says that 1986's improvement in Canadian trade may be attributed to a strike at a Canadian plant. The final deficit for the year is expected to be much greater than would be extrapolated from the year-to-date figure. To a lesser extent, the imbalance with Mexico is anticipated to be much higher than at present, but less than experienced last year.

Carbon black trade balance(millions of lbs.)

	Total	Canada	Mexico	Other
1981	89.7	-18.5	8.1	100.1
1982	39.8	-12.1	0	51.9
1983	8.7	-21.6	-16.5	46.8
1984	-80.5	-73.8	-45.7	39.0
1985	-73.9	-68.5	-44.0	38.6
7 mos. 1986	-43.6	-39.5	-27.5	23.4

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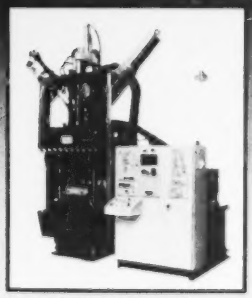

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MANAGEMENT AND CIRCULATION

(Act of August 12, 1970; Section 3685, Title 39, United States Code)

1A. Title of publication: Rubber World.
1B. Publication no.: 00359572.
2. Date of filing: 10/1/86.
3. Frequency of issue: Monthly.
3A. Number of issues published annually: 12.
3B. Annual subscription price: $23.00.
4. Location of known office of publication: P.O.Box 5485, 1867 West Market Street, Akron, OH 44313.
5. Location of the headquarters or general business offices of the publishers: P.O. Box 5485, 1867 West Market [illegible], Akron, OH 44313.
6. Names and addresses of publisher, editor and managing editor: Publisher, Job H. Lippincott, 1867 West Market Street, Akron, OH 44313; Editor, Don R. Smith, 1867 West Market Street, Akron, OH 44313; Technical Editor, David A. Given, 1867 West Market Street, Akron, OH 44313.
7. Owner (is owned by Lippincott & Peto, Inc.) Shareholders owning more than 1%. Lippincott & Peto, Inc., 1867 West Market St., Akron, OH 44313; Job H. Lippincott, 1472 Graham Rd., Silver Lake, OH 44224; John W. Peto, 103 Cedar Lane, Ridgefield, CT 06877.
8. Known bondholders, mortgages, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages or other securities: None.
9. Not applicable.
10. Extent and nature of circulation:

	Average no. copies each issue during preceding 12 months	Actual no. copies of single issue published nearest to filing date
A. Total no. copies printed (net press run)	13,221	12,949
B. Paid Circulation		
1. Sales through dealers and carriers, street vendors and counter sales	None	None
2. Mail subscriptions	6,727	6,857
C. Total paid circulation	6,727	6,857
D. Free distribution by mail, carrier or other means: Samples, complimentary, and other free copies	5,502	5,569
E. Total distribution (Sum of C and D)	12,229	12,426
F. Copies not distributed:		
1. Office use, left-over, unaccounted, spoiled after printing	992	523
2. Returns from news agents	None	None
G. Total (Sum of E, F1 and 2 - should equal net press run shown in A)	13,221	12,949

I certify that the statements made by me above are correct and complete.

Job H. Lippincott
Publisher

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RubberWorld

The technical service magazine for the rubber industry

Volume 195, No. 3

December 1986

Coloring: rubber products

silicone elastomers

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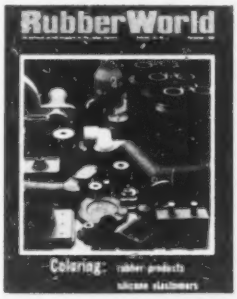

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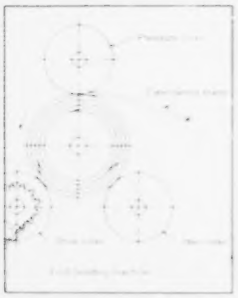

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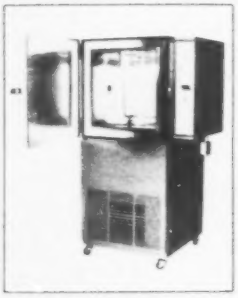

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5 Business Briefs

Acquisitions, expansions; contracts, licenses; financial statements; markets, news.

12 Tech Service: Foaming TPE

by Jon Menough, contributing technical service editor. With the use of Santoprene thermoplastic rubber, Monsanto has recently made possible a foamed rubber with many of the properties of traditional rubber compounds, yet which can be produced through more easily controlled processes.

16 Quality Management: Deadly sins 6 and 7

by David Crosby, Crosby & Co. This month's column looks at the lack of the use of training and statistical process control in producing a quality product.

18 Urethane Forum: Product liability reform

by Bill Stahr, Brad & Associates. A brief review of the Polyurethane Manufacturers Association's panel discussion on "Surviving the liability insurance crisis," held during the PMA's fall meeting.

20 The coloring of rubber products

by Thomas A. Geekie and Richard L. Silver, Akron Chemical Co. This article concentrates on the use of organic and inorganic pigment colorants and the rubber compounds in which they are used.

24 Compounding and coloring silicone elastomers

by John Razzano, General Electric. A brief overview of the general properties of siloxanes polymers and how the inherent properties of such polymers can be translated into rubber products with high performance properties is accompanied by a discussion of the coloring of silicone rubber compounds.

31 Rollcovering equipment, techniques and current problems

by J. Dean Armstrong, Jr., Roller Equipment Manufacturing Co. The author discusses some established methods of manufacture of rollcoverings, some new methods, problems associated with each, and some possible solutions.

36 Patent News

edited by Bob Samples, Akron Rubber Development

44 Techno Mart

New equipment, instruments, CAD/CAM, products and materials.

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Cover

Cover courtesy of Central Rubber, a Woodhead Industries, Inc. company

A Lippincott & Peto Publication

Business Briefs

Contracts, licenses

Hercules has appointed **Harwick Chemical** as its distributor for key peroxide and pentaerythritol products to the rubber industry in the 37 states east of the Rocky Mountains.

Unichema Chemicals announced that beginning January 1 it will assume responsibilities for marketing all glycerine produced by **Lever Brothers**.

BP Ventures announced that it has granted a worldwide manufacturing and sales license for its pigment Shieldex to **W.R. Grace & Co.**

MTS Systems and **Maschinenfabrik Mueller-Weingarten AG** have reached an agreement in principle on terms of extending their preliminary license to a permanent license. The license will cover the technology of process-controlled short stroke presses.

Jones & Vining and **Bata Industries, Limited** have mutually decided not to pursue further discussion relating to the acquisition by Jones & Vining of Bata's Cimtech Division.

Scandura North America has just signed a contract with **Pathex International Ltd.** for construction of the largest down acting belt press in the world.

Malaysian Rubber Research and Development Board has announced that sales and promotion of Novor urethane vulcanizing agents will be handled by the MRRDB's professional consulting service, **Rubber Consultants**.

Financial statements

American Biltrite reported net earnings of $1 million on sales of $29.3 million for the third quarter.

Armstrong Tire reported a 16 percent gain in sales through its independent dealer network for the fiscal year ending September 30.

Ausimont Compo N.V. reported third quarter net income of $8.1 million on net sales of $148.7 million.

BASF reported third quarter earnings before taxes of $966 million on sales of $13.9 billion.

Blasius Industries reported net earnings for the third quarter of $198,000 on sales of $10.9 million. Operating income for the year is $3.5 million on net sales of $41.9 million for 1986.

The **British Petroleum Company** reported a third quarter cost profit after tax of $511 million on earnings of $1.12 billion.

Cabot reported net income of $71 million for the year on net sales of $1.3 billion.

Carlisle has announced net earnings of $4.9 million on sales of $122.9 million for the third quarter.

Degussa AG announced a turnover amounting to $5.6 million DM in the second half of the business year, and a turnover for the whole of the business year of $10.8 million DM.

Goodall Rubber reported third quarter earnings of $169,000 before taxes on sales of $15.5 million.

Jones & Vining announced a net loss for the third quarter of $627,000 on sales of $4.7 million.

Lydall announced earnings for the third quarter of $314,000 on sales of $26.9 million.

NL Industries announced third quarter net loss of $27.9 million on sales of $308.2 million.

Park-Ohio Industries reported a net loss of $2.4 million in the third quarter on net sales of $30 million.

The **Royal Dutch/Shell Group of Companies** announced net income for the third quarter of $783,000 on net sales proceeds of $14.6 million.

Markets, news

Combined U.S. and Western European sales of sealing devices (o-rings, diaphragms, boots and bellows, static seals and gaskets, and dynamic oil, shaft and hydraulic/pneumatic seals) were approximately $2.4 billion in 1985, and will grow almost $3.0 billion in 1990 a multiclient market research study by Gabris International shows.

Total elastomer consumption (U.S. and Europe) will expand from 128,000 to more than 135,000 metric tons during the 1985 to 1990 period. Real elastomer sales values will increase from approximately $570 million to more than $650 million during this period, according to the study. Sales growth will largely result from substitution of low priced commodity products by higher performance specialties, blends and alloys.

The study also reports that noteworthy declines will be experienced by conventional nitriles, SBR, butyl and natural rubber, along with most chlorinated elastomers. Strong growth will be experienced by specialty nitriles, acrylics, urethanes, silicones, EP and fluoro-elastomers. Thermoplastic elastomer growth in sealing devices will be particularly strong at greater than 50% over the next five years, according to the study. The sealing device industries on

RMA tire report through September (figures in thousands of units)

Passenger tires	YTD 1986	YTD 1985	%change
Shipments			
Original equipment	41,396	41,705	-0.74
Radial	34,819	34,747	0.21
Replacement	107,642	106,043	1.51
Radial	92,768	85,329	8.72
Export	2,932	3,803	-22.90
Radial	2,248	3,002	-25.12
Total	151,970	151,551	0.28
Radial	129,835	123,078	5.49
Production	118,796	123,755	-4.01
Radial	100,395	98,554	1.87
Truck & bus tires			
Shipments			
Original equipment	5,236	5,877	-10.91
Radial	3,487	3,672	-5.04
Replacement	23,798	23,772	0.11
Radial	11,340	10,209	11.08
Export	988	1,006	-1.79
Radial	596	529	12.67
Total	30,022	30,655	-2.06
Radial	15,423	14,410	7.03
Production	22,985	26,558	-13.45
Radial	11,181	12,168	-8.11

Business Briefs

both sides of the Atlantic face a period of dramatic change.

Major concerns and issues, according to this study, range from material substitution dynamics and the need to upgrade performance in important end use segments, to uncertain major market segment prospects, and stronger competition from low cost, but improving quality imports.

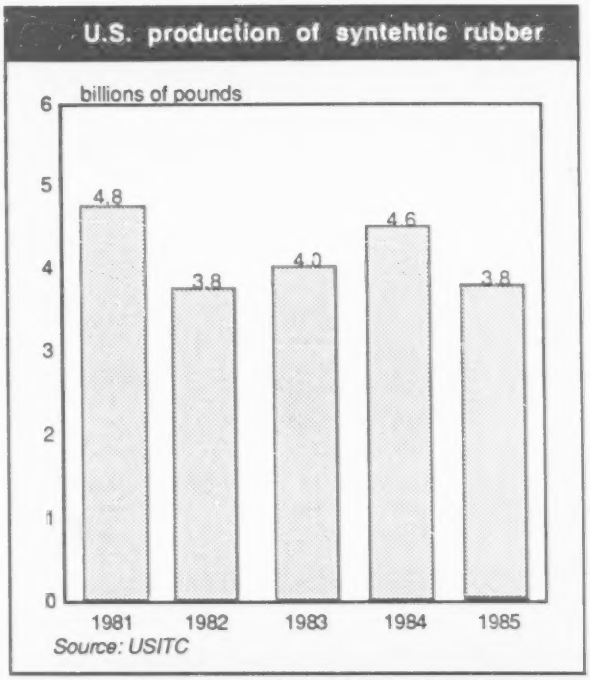
According to a report from the United States International Trade Commission, production of rubber-processing chemicals as a group in 1985 amounted to 260 million pounds, or 10 percent less than the 288 million pounds produced in 1984. Sales of rubber-processing chemicals in 1985 amounted to 174 million pounds, valued at $281 million, compared with 176 million pounds, valued at $287 million, in 1984.

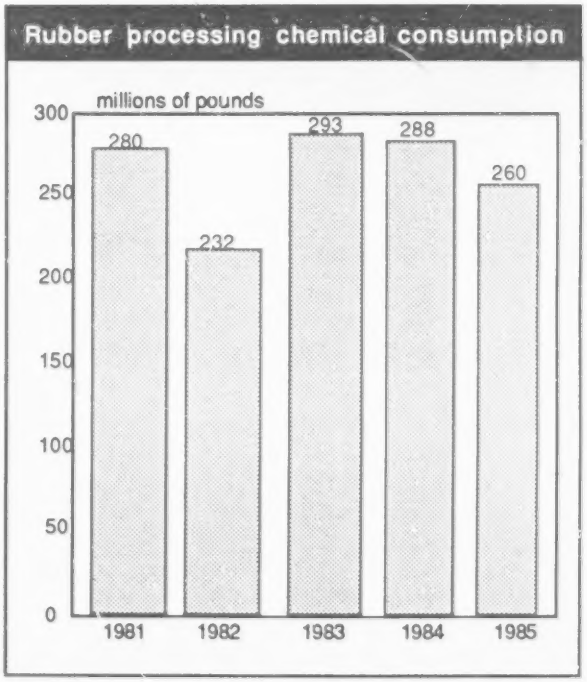
The production of cyclic rubber-processing chemicals in 1985 amounted to 237 million pounds, or 9 percent less than the 260 million pounds produced in 1984. Sales of cyclic rubber-processing chemicals in 1985 totaled 155 million pounds, valued at $258 million, compared with 154 million pounds, valued at $261 million, in 1984. Of the total production of cyclic rubber-processing chemicals in 1985, antioxidants, antiozonants, and stabilizers accounted for 67 percent, and accelerators, activators and vulcanizing agents for 29 percent. Production of antioxidants, antiozonants and stabilizers, which amounted to 160 million pounds in 1985, included 100 million pounds of amino compounds and 59 million pounds of phenolic and phosphite compounds. Sales of amino antioxidants, antiozonants and stabilizers in 1985 amounted to 71 million pounds, valued at $108 million; sales of phenolic and phosphite antioxidants, antiozonants and stabilizers were 34 million pounds, valued at $59 million.

Production of acyclic rubber-processing chemicals in 1985 amounted to 23 million pounds, or 18 percent less than the 28 million pounds produced in 1984. Sales in 1985 totaled 20 million pounds, valued at $22 million, compared with 22 million pounds, valued at $26 million, in 1984. Dithiocarbamic acid derivatives accounted for 30 percent of the production of acyclic rubber-processing chemicals in 1985.

Total U.S. production of synthetic rubber in 1985, according to the same USITC report amounted to 3.8 billion pounds, a decrease of 16.9 percent from that produced in 1984. The production of synthetic rubber declined irregularly from 4.8 billion pounds in 1981 to 3.8 billion pounds in 1985, or by 21.1 percent. Total sales of elastomers in 1985 amounted to 2.2 million pounds, a decrease of 17.1 percent from that sold in 1984.

Styrene-butadiene rubber in 1985 continued to be the elastomer produced in the greatest quantity as it has been for more than a quarter of a century. U.S. production of SBR-type rubber, including 11 million pounds of its vinylpyridine sub-type, amounted to 1.4 billion pounds in 1985. Solution polymerized butadiene rubber, a stereotype elastomer, was produced domestically in 1985 in the next largest amount - 600 million pounds. Other principal types of synthetic elastomers for which U.S. production data are reported separately are ethylene-propylene rubber, production of which was 440 million pounds in 1985; and butadiene-acrylonitrile (NBR-type) rubber, production of which was 118 million pounds.





Sales of SBR-type rubber by U.S. producers in 1985 amounted to 651 million pounds. Sales of solution polymerized butadiene rubber amounted to 268 million pounds, and those of ethylene-propylene rubber to 311 million pounds. Sales of NBR-type rubber in 1985 amounted to 104 million pounds.The rubber processing chemicals and synthetic rubber reports were part of the report entitled Synthetic Organic Chemicals. Production of all types decreased 2.6 percent in 1985

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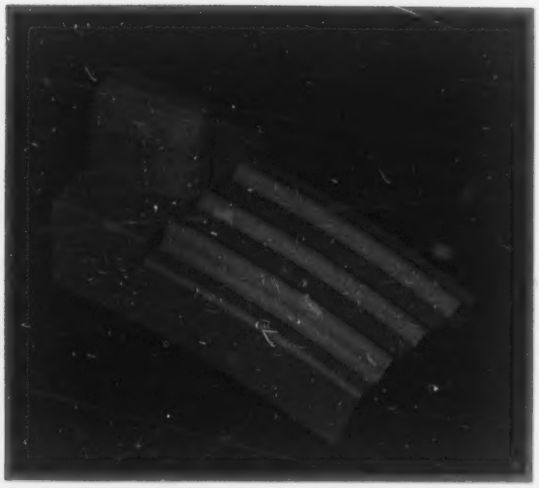
RubberWorld

The technical service magazine for the rubber industry

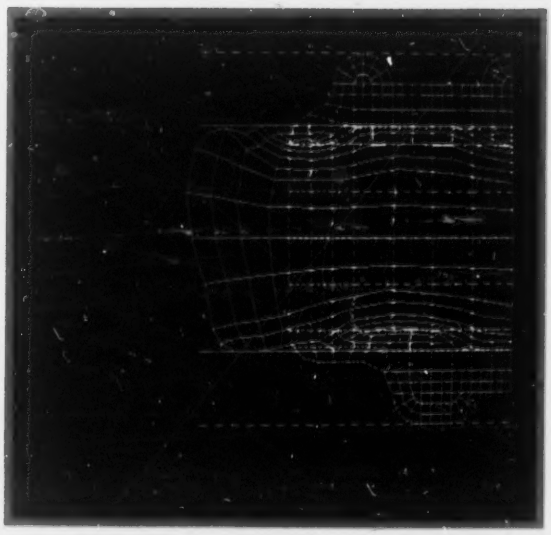
Volume 195, No. 4 January 1987



Tech Service '87

Partners in design evolution... Automotive industry – rubber suppliers

Directories
Independent testing labs
Suppliers technical service



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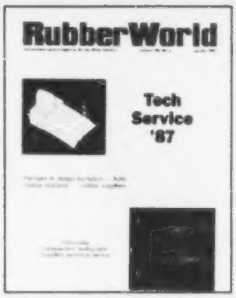

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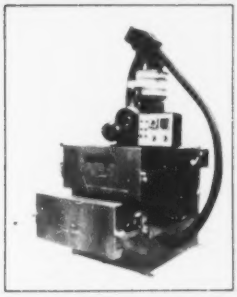

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5 Business Briefs

Acquisitions, expansions; contracts, licenses; financial statements; markets, news.

7 Quality Management: Desktop SPC

by David Crosby, Crosby & Co. Directions and an X-bar and R worksheet allow the reader to construct control charts and perform a process capability, in order to gain an understanding of statistical process control.

12 Tech Service: An alternative for ETU?

by Jon Menough, contributing technical service editor. This column explores the use of Ricon M.A.D. as a substitute for ethylene thiourea (ETU), a valuable resin that has been proven toxic.

14 Urethane Forum: Opportunities in recreation and leisure

by Bill Stahr, Brad & Associates. A review of papers presented at the fall meeting of the Polyurethane Manufacturers Association dealing with the use of polyurethane in the recreational and leisure fields.

18 Partners in design evolution — the automotive industry and rubber suppliers

by John B. Lewis, Stephen R. Plumley and Karen J. Lewis, Plumley Rubber. Working as partners with their suppliers in the development of products, automotive companies can simultaneously increase quality and decrease costs. Exploring the future of this partnership, the authors examine the past, then look at where this relationship is in the present.

23 Independent testing laboratories directory

An alphabetical listing of independent testing laboratories, along with addresses, contact persons and areas of expertise.

27 Suppliers directory

An alphabetical listing of suppliers to the rubber industry, with addresses, contact persons, quality assurance contacts and technical service areas offered.

42 Suppliers and areas of expertise

Companies and their areas of expertise are cross referenced under the categories of polymers, materials/ingredients, fillers and processing aids.

45 Patent News

edited by Bob Samples, Akron Rubber Development

49 Techno Mart

New equipment, instruments, CAD/CAM, products and materials

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Cover

Cover photos courtesy of Plumley Rubber Corp.

A Lippincott & Peto Publication

Business Briefs

Acquisitions, expansions

Dow Corning acquired silicone rubber compounders **J-Sil U.S.** and **Western Silicone Products.** J-Sil has plants in Manchester, CT and Kendallville, IN and the WSP facility is located in Walnut, CA.

The **M.S. Hanna Co.**, Cleveland, OH acquired **Burton Rubber Processing**, Burton, OH, a custommixer with plants in Burton, Macedonia, OH and Jonesboro, TN.

Exxon Chemical's French subsidiary, Socabu, completed a 30% expansion of its ethylene-propylene rubber plant at Notre-Dame-de-Gravenchon to 65,000 tons per year.

SunCor Development Co. acquired substantially all of the assets of the Goodyear Farms, Litchfield Park Properties and the Westinghouse-Goodyear Properties in the Litchfield Park - Goodyear area in Arizona as part of **Goodyear's** restructuring program.

Arco Chemical will acquire the polyols manufacturing facilities of Atochem at Rieme, Belgium. The plant has a 70,000 tons per year capacity but Arco will make additional investments for debottlenecking and modernization.

Phelps Dodge Corp. completed its purchase of **Columbian Chemicals** for approximately $250 million. Columbian is the second largest producer of carbon blacks in the U.S., operating five plants domestically and, through subsidiaries, six carbon black plants in the U.K., Canada, Germany, Italy and the Phillippines.

Salem Republic Hose, Sebring, OH doubled its custom calendering capacity.

Great Lakes Chemical has agreed to purchase **Pentech Corp.** which includes **QO Chemicals** as a subsidiary.

Pony Industries acquired the ChemLink business groups, certain specialty chemical units and the building products units of **Arco Chemical.**

The **Kelly-Springfield Tire Co.** will retain its headquarters in the Cumberland, MD area by building a 97,500 sq. ft. office building with a 55,000 sq. ft. adjacent tire testing laboratory.

BFGoodrich acquired the Jet Electronics & Technology Inc., a **Gates Learjet** subsidiary located in Grand Rapids, MI

Rhe-Tech, Inc., Whitmore Lake, MI increased production capacity by 30 million pounds annually for its thermoplastic compounds, alloys and elastomers.

British Petroleum Co. bought the Hitco subsidiary of **Owens-Corning Fiberglas.** Hitco has interests in both advanced materials and the fabrication of end products for aerospace, automotive and marine industries.

Hercules Inc. and **AccuRay Corp.**, Columbus, OH have agreed to merge. AccuRay manufactures measurement and control systems.

The **Hutchinson Group** has purchased substantially all of the business assets of **CRC Corduroy** and **CRC Cadillac** and will continue to manufacture the complete line of anti-noise and anti-vibration rubber products through Paulstra CRC Corp.

Samsung Petrochemical Co., a joint venture between Samsung Group, Amoco Chemicals and Mitsui Petrochemical Industries is undertaking expansion of its Ulsan, Korea purified terephthalic acid facility. Upon completion in January 1988, capacity will increase to 220,000 metric tons of PTA annually.

C.P. Hall acquired the packaged chemical division of **K.A. Steel Chemicals Inc.**

Asarco has established a Technical Services Center in Salt Lake City, UT to provide consulting services in various areas including engineering, environmental sciences, research and security.

Rheometrics opened offices in Chicago, IL, Austin,

RMA rubber report through September 1986(figures in metric tons)

	Cumulative 1986	Cumulative 1985	% change
Total new rubber			
New rubber available	2,290,871	2,235,562	2.47
Imports	777,548	815,233	-4.62
Exports	291,128	276,514	5.29
Apparent consumption	1,985,816	1,966,228	1.00
Total natural rubber			
Imports	585,127	604,521	-3.21
Exports	28,158	29,949	-5.98
Apparent consumption	561,274	585,974	-4.22
%total new rubber	28.26	29.80	
Total synthetic rubber			
Production	1,513,323	1,420,329	6.55
Imports	192,421	210,712	-8.68
Exports	262,970	246,565	6.65
Apparent consumption	1,424,542	1,380,253	3.21
Total SBR			
Production	575,349	563,599	2.08
Imports	75,027	73,992	1.40
Exports	76,762	63,002	21.84
Apparent consumption	581,265	589,482	-1.39
Total nitrile			
Production	45,735	42,669	7.19
Imports	9,173	8,859	3.54
Exports	8.968	4,995	79.54
Apparent consumption	46,448	45,278	2.58
Polybutadiene			
Production	262,085	262,967	.05
Imports	41,703	53,429	-21.95
Exports	15,564	18,767	-17.07
Apparent consumption	271,802	287,720	-5.53
Ethylene-propylene			
Production	177,458	169,223	4.87
Imports	3,521	725	385.6
Exports	34,281	27,724	23.65
Apparent consumption	140,943	136,897	2.96
Butyl, polychloroprene, polyisoprene, silicone and other synthetic elastomers			
Production	452,696	382,871	18.24
Imports	62,997	73,707	-14.53
Exports	127,395	132,077	-3.54
Apparent consumption	384,083	320,875	19.70

Business Briefs

TX and Newport Beach, CA.

Carlisle Companies Inc. has acquired **Data Electronics, Inc.**, a San Diego, CA manufacturer of magnetic tape data cartridges and other data communications products and **DSI Inc.**, Denver, CO a company that sells and services data communications equipment.

BASF Corp. has begun construction on plants for the production of specialty amines and polytetrahydrofuran and is expanding tetrahydrofuran capacity at its Geismer, LA facilities.

Bridgestone Canada moved its head office operations from Vancouver to Toronto.

Contracts, licenses

Under a joint agreement between the U.S. Departments of Agriculture and Defense, **Firestone** was awarded a contract to support the development of a domestic natural rubber industry. Firestone is to design, construct and operate a prototype plant for the commercial processing of guayule at the Gila River Indian community near Phoenix, AZ. The plant, to be in operation by early 1988, will use a solvent extraction process to recover the rubber and will have a capacity of 150 long tons per year.

Carlisle SynTec Systems chose **Coastal Atlantic Associates** as its representative in Maryland and Virginia for its single ply roofing systems.

Neville Chemical named **G-3 Industries**, Aurora, CO as agent representative for the Rocky Mountain area for its hydrocarbon resins and paraffins.

Financial statements

Blasius Industries reported net earnings for the second quarter of $438,000 on sales of $11.6 million.

Firestone reported net income for the fiscal year ending Oct. 31, 1986 of $85 million. Sales totaled $3.5 billion.

Markets, news

Goodyear predicts a substantial growth in sales of automotive aftermarket parts this year predicated on the fact that motorists are driving their cars farther and keeping them longer. The belts and hose industry alone should grow to $975 million in retail sales, a 5% increase over 1986, according to Paul Foley, Goodyear's manager of automotive replacement products. He predicts that the average miles driven per vehicle should exceed 10,000 miles a year which would be a record and that the average car age will set a record of 7.9 years and the truck population should hit 8.6 years.

The U.S. chemical industry made a strong recovery during 1986, benefitting from the costly restructuring and reorganization which made 1985 one of the worst in its history. The industry's 1986 earnings are expected to be a record $13.3 billion, 54.5% above 1985 earnings. However, the 1986 earnings performance is only 2.3% above the previous record of $13 billion set in 1981 and again in the post-recession recovery year of 1984. Total industry sales during 1986 are expected to be $216 billion, just 1% over 1985. During 1986 the chemical trade surplus rose for the first time in five years by 5% to $7.6 billion. U.S. chemical exports are expected to reach $22.7 billion, or 10.5% of total industry shipments. Chemical imports continued to climb as well, by 4% over 1985 to a record $15.1 billion.

RMA tire report through September (figures in thousands of units)

Passenger tires	YTD 1986	YTD 1985	%change
Shipments			
Original equipment	46,494	46,619	-0.27
Radial	39,120	38,888	0.60
Replacement	121,512	119,588	1.61
Radial	104,922	96,625	8.59
Export	3,340	4,060	-17.73
Radial	2,568	3,170	-18.99
Total	171,346	170,267	0.63
Radial	146,610	138,683	5.72
Production	134,027	138,338	-3.12
Radial	113,426	110,464	2.68
Truck & bus tires			
Shipments			
Original equipment	5,833	6,556	-11.03
Radial	3,913	4,131	-5.28
Replacement	27,134	26,894	0.89
Radial	13,023	11,623	12.05
Export	1,097	1,125	-2.49
Radial	656	602	8.97
Total	34,064	34,575	-1.48
Radial	17,592	16,356	7.56
Production	25,935	29,601	-12.38
Radial	12,699	13,525	-6.11

Synthetic rubber imports(000 tons)

	1980	1982	1984	1985
Germany, F.R.	244.1	240.6	257.2	273.6
U.S.A.	125.8	145.6	237.0	264.9
Italy	153.8	127.3	147.7	160.9
France	172.7	133.8	145.4	147.4
U.K.	137.1	137.4	136.7	142.4
Japan	51.1	60.7	57.9	66.9

Source: IRSG

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RubberWorld

The technical service magazine for the rubber industry

Volume 195, No. 5

February 1987

Custom mixing '87

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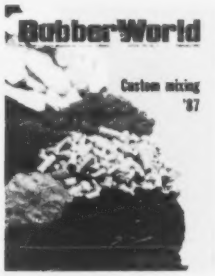

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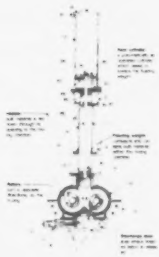

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Predicting processability p. 26

6 Business Briefs
Acquisitions, expansions; contracts, licenses; financial statements; markets, news.

12 Tech Service: Mineral fillers — an old story
by Jon Menough, contributing technical service editor. This month's column looks at fillers used in rubber compounding, such as clay, calcium carbonate, coal and others. Health aspects and uses of the fillers are discussed.

14 Quality Management: The Shangrila Syndrome (the quality success/failure cycle)
by David Crosby, Crosby & Co. The author examines the quality success/failure cycle, where quality is improved after customers complain, but returns to below standards quality until complaints are again made.

16 Urethane Forum: Workshops, seminars for processing help
by Bill Stahr, Brad & Associates. This column reviews the Polyurethane Manufacturers Association's Processing Techniques Seminars, one day meetings offering technical paper presentations by industry experts and informal workshop dialogue on polyurethane processing problems and concerns.

19 Banbury mixing optimization using Taguchi design of experiments technique
by John D. Rulon, Sheller-Globe Corp. The purpose of the experiment described in this article is to optimize mixing conditions and to send a more consistent and better mixed product to the extrusion lines by using the Taguchi design of experiments technique.

26 The use of the MPT in predicting processability
by John A. Sezna, Monsanto Co. and Mark J. Saake, United Technologies — Automotive. A capillary rheometer with a die swell detector was used in this study to measure variations in production compounds for an extrusion process, proving to be a much more sensitive instrument for detecting variations in the flow properties of rubber compounds than the oscillating disk rheometer.

36 Custom mixing directory
This directory of U.S. custom mixers of rubber and other rubber custom services suppliers is accompanied by a map showing their locations and a special literature page featuring brochures on custom mixers and custom services suppliers.

42 Patent News
edited by Bob Samples, Akron Rubber Development

56 Techno Mart
New equipment, instruments, CAD/CAM, products and materials

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Cover

Cover photos courtesy of Pawling Corp.

A Lippincott & Peto Publication

Business Briefs

GenCorp reported net income of $130 million for 1986 with net sales of $3.1 billion.

Parker Hannifin reported second quarter net income of $21.1 million on sales of $446 million.

Standard Products reported net sales of $118.5 million for the second quarter with net income at $7.5 million.

Markets, news

The International Institute of Synthetic Rubber Producers projects an annual growth rate of 0.3% in North America through 1991 and a 1.2% yearly growth in synthetic rubber production in Western Europe for the same period. Total new rubber consumption fell 1% in North America in 1986 according to the IISRP's preliminary report, and rose 1.3% in Europe. For North America, demand for SBR will decline over the next five years by 0.3% a year, EPDM, in non-tire applications such as roofing and underhood automotive parts will exhibit the fastest growth of the general purpose elastomers, with demand increasing at a 2.3% per year rate and demand for thermoplastic elastomers is expected to reach 250,000 metric tons by 1991 compared to the 200,000 mt consumption of 1986.

After a year of little increases in custom mixing capacity or capacity utilization, many mixers of custom rubber and those offering custom services to the rubber industry plan expansions of their business according to a *Rubber World* survey of North American custom mixers. Among those indicating an increase in capacity are: Uniroyal Plastics has a multi-million dollar expansion project coming on stream early this year that will increase capacity from 65 million lbs. to 100 million lbs. per year; Polysar Rubber Services is undergoing expansion in silicone compounding and is increasing pelletizing capability at its East Brunswick, NJ plant; Burton Rubber, which was bought by the M. Hanna Company, indicated it would increase capacity in 1987 after increasing capacaity 10% in 1986; Colonial Rubber was expanding into plastics compounding and Pawling Corp. modified mixing equipment to increase capacity and went to three shifts. Those that increased capacity in 1986 were Depco, Rainbow Mastermixing and Valley Processing.

Among the companies offering custom services to the rubber industry, very little expansion took place in 1986, but some had plans for this year. Chemical Associates will be adding bulk storage and mixing equipment; Rubber/Urethanes is adding a 75,000 sq. ft. manufacturing plant in Gainesville, TX; Salem-Republic Rubber is doubling calendering capacity and Sparton Enterprises is increasing grinding capacity by 25% after increasing it by the same amount in 1986.

Besides Burton, ownership also changed for J-Sil U.S. and Western Silicone Rubber who were bought by Dow Corning and Hoover-Hanes and Midwest Rubber who were purchased by a divison of Rubatex Inc.

Users of hard rubber standards are urged to comment on the proposed withdrawal of four ASTM standards. The withdrawal is due to a lack of technical expertise and interest in standards D 530, D 639, D 2135 and D 2707. Further information is available from ASTM.

RMA tire report through November
(figures in thousands of units)

Passenger tires	YTD 1986	YTD 1985	%change
Shipments			
Original equipment	52,399	51,121	2.50
Radial	42,599	42,631	-0.08
Replacement	133,367	130,691	2.05
Radial	115,429	106,115	8.78
Export	3,696	4,317	-14.38
Radial	2,844	3,333	-14.67
Total	189,462	186,129	1.79
Radial	160,872	152,079	5.78
Production	146,743	151,099	-2.88
Radial	124,472	121,176	2.72
Truck & bus tires			
Shipments			
Original equipment	6,357	7,182	-11.49
Radial	4,273	4,542	-5.92
Replacement	28,987	29,588	-2.03
Radial	14,459	12,824	12.75
Export	1,184	1,233	-3.97
Radial	706	622	6.65
Total	36,528	38,003	-3.88
Radial	19,438	18,028	7.82
Production	28,363	32,038	-11.47
Radial	14,014	14,701	-4.67

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RubberWorld

The technical service magazine for the rubber industry Volume 195, No. 6 March 1987

Modern extrusion technology
Aspects of transfer injection molding
Compounding ingredients price list

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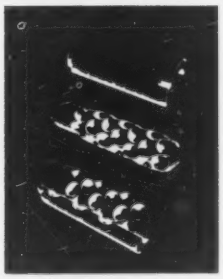

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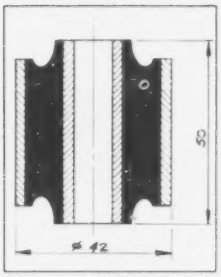

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6 Business Briefs

Acquisitions, expansions; contracts, licenses; financial statements; markets, news.

10 Tech Service: Pressblowing

by Jon Menough, contributing technical service editor. A pressblower, which combines the advantages of extrusion and injection blow molding and makes it possible to injection mold thicker head sections completely, is featured in this month's column.

12 Quality Management: IISRP statement on SPC and quality assurance systems

The statement on statistical process control and quality assurance systems adopted by the International Institute of Synthetic Rubber Producers, Inc. at its meeting last spring in Buenos Aires is presented in this columm.

14 Urethane Forum: Basic handling of prepolymers and curatives

by Bill Stahr, Brad & Associates. The paper "Shop handling and practices for urethane prepolymers and curatives," by Frank Paavola of Albert Trostel Packings, which begins with the receipt of chemicals and proceeds through the production operation to the shipment of the final parts, is outlined.

17 An overview of modern extrusion technology

by Dennis Kemper and Joe Haney, Gates Rubber Co. The equipment and compounding of rubber has evolved over the years to the modern state that is described in this article. This evolution has produced a wide variety of equipment and materials from which to choose.

24 Aspects of injection transfer molding

by Jack Corbett, REP Corp. After exploring the different families of dynamic automotive parts, the author reviews the production of a conventional shockmount by injection transfer, considering in succession the different components of such production set-up.

32 The development and use of natural rubber structural bearings for earthquake protection

by C.J. Derham, Rubber Consultants. In this article a base isolation system is described in which all of the requirements, such as wind sway control, high damping and fire resistance, are met as intrinsic properties of the rubber bearings.

43 Patent News

edited by Bob Samples, Akron Rubber Development

45 Techno Mart

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Cover

Cover photo courtesy of Monsanto Chemical Co.

A Lippincott & Peto Publication

Business Briefs

tributor for the Southeast.

Dock Resins Corp appointed **New England Resins & Pigments Corp.**, Woburn, MA as a sales representative.

Financial statements

Armstrong Rubber reported net income for the first quarter of $4 million on sales of $257.3 million.

BP Chemicals reported operating profit of $291 million in 1986.

Cooper Tire had a 1986 net income of $23 million on sales of $577.5 million.

Day International reported first quarter earnings of $3.9 million on sales of $130.8 million

Engelhard Corp. had 1986 earnings of $53.3 million on sales of $2.29 billion.

Essex Chemical reported 1986 net income of $8.8 million on sales of $205.6 million.

Firestone reported first quarter net income was $41 million on sales of $846 million.

GenCorp had a net income of $130 million in 1986 on sales of $3.1 billion.

BFGoodrich reported 1986 net income of $32.7 million on sales of $2.6 billion.

Goodyear reported 1986 income of $100.7 million on sales of $9.1 billion.

M.S. Hanna Co. incurred a net loss for 1986 of $104.5 million on sales of $130.3 million.

Jones & Vining had a net loss for 1986 of $722,618 on sales of $27.7 million.

Lubrizol Corp. reported 1986 net income was $78.1 million with sales of $913.3 million.

Lydall had 1986 earnings of $2.5 million on sales of $113 million.

Rubbermaid reported 1986 earnings of $70.1 million on sales of $795 million.

Sumitomo Chemicals reported 1986 earnings of $30 million on sales of $3.2 billion.

RMA tire report for 1986 (figures in thousands of units)

Passenger tires	YTD 1986	YTD 1985	
Shipments			
Original equipment	54,392	54,839	-0.82
Radial	45,778	45,773	0.01
Replacement	144,455	141,455	1.99
Radial	125,102	115,412	8.40
Export	4,032	4,625	-12.82
Radial	3,098	3,556	-12.88
Total	202,691	200,919	0.88
Radial	173,978	164,741	5.61
Production	159,350	162,584	-1.99
Radial	135,444	130,952	3.43
Truck & bus tires			
Shipments			
Original equipment	6,859	7,696	-10.90
Radial	4,631	4,895	-5.39
Replacement	32,392	32,098	0.92
Radial	15,732	14,009	11.58
Export	1,302	1,335	-2.47
Radial	773	723	6.92
Total	40,553	41,131	-1.41
Radial	21,136	19,717	7.20
Production	30,939	34,339	9.90
Radial	15,476	15,815	-2.14

RMA industry rubber report for 1986 (figures expressed in metric tons)

	Cumulative 1986	Cumulative 1985	%
Total new rubber			
New rubber available	3,010,135	2,919,787	3.09
Imports	1,024,645	1,081,927	-5.29
Exports	391,891	364,630	7.48
Apparent consumption	2,617,144	2,576,439	1.58
Total natural rubber			
Imports	769,345	813,575	-5.44
Exports	36,473	40,041	-8.91
Apparent consumption	744,647	774,683	-3.88
%total new rubber	28.45	30.06	
Total synthetic rubber			
Production	1,985,490	1,837,860	8.03
Imports	255,300	268,352	-4.86
Exports	355,418	324,589	9.50
Apparent consumption	1,872,497	1,801,756	3.93
Total SBR			
Production	791,501	735,061	7.68
Imports	95,843	94,303	1.63
Exports	111,713	83,002	34.59
Apparent consumption	770,183	766,303	.51
Total nitrile			
Production	57,747	53,185	8.58
Imports	12,311	11,161	10.30
Exports	11,915	6,713	77.49
Apparent consumption	59,999	58,645	2.31
Polybutadiene			
Production	324,569	330,279	-1.73
Imports	60,417	66,503	-9.15
Exports	23,708	23,954	-1.03
Apparent consumption	357,985	371,739	-3.70
Ethylene-propylene			
Production	229,629	214,810	6.90
Imports	4,460	1,277	249.26
Exports	45,107	38,370	17.56
Apparent consumption	186,404	177,623	4.94
Butyl, polychloroprene, polyisoprene, silicone and other synthetic elastomers			
Production	582,044	504,526	15.36
Imports	82,260	95,108	-13.50
Exports	162,975	172,550	-5.55
Apparent consumption	497,927	427,447	16.49

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RubberWorld

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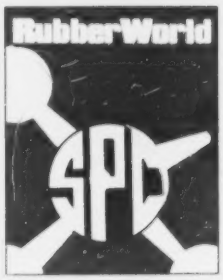

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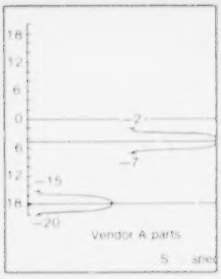

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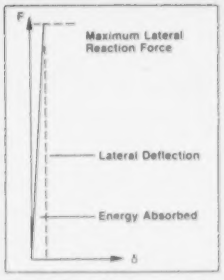

Bonded elastomers p. 38

5 Business Briefs

Acquisitions, expansions; contracts, licenses; financial statements; markets; news.

10 Tech Service: What would you do if . . .?

by Jon Menough, contributing technical service editor. This month's column looks at the Emergency Contingency Plan, an outline of possible emergency situations that may arise in an operation, and descriptions of courses of action that should be followed to control the situation, clean it up and notify the proper governmental agencies.

12 Quality Management: Public sector support of private sector training — the view from both sides

by Eric Berg, Technicomp, Inc. An interview with Curtis Tyler, director of the Erie/North Lake (Ohio) Consortium and Barbara Rothel, training director of the Industrial Powder Coatings Company (IPC), Norwalk, Ohio, reveals the kinds of governmental aid that is available to help employers implement training programs.

15 Urethane Forum: New castable systems focus of spring meeting

by Bill Stahr, Brad & Associates. The author provides an overview of the 1987 Spring Meeting of the Polyurethane Manufacturers Association, the theme of which is "Commercial development of new castable systems."

17 Strategies for process improvement

by Alonzo Church, Jr., GenCorp. The author looks at methods for achieving process improvement, which is defined as any action or change which produces a better product and perhaps, in addition, a manufacturing cost benefit.

24 The mechanics of SPC guided purchasing

by Robert Fabian, Acushnet Co., Rubber Division. The statistical process control-guided purchasing system, which can be used to efficiently attain better quality and reduced costs when used cooperatively by suppliers, is discussed in this article.

28 Implementing plant-wide SPC within a one year time-frame

by Scott Montgomery, Technicomp, Inc. This case study describes how one company, a manufacturer of a wide variety of extruded and injection molded rubber parts, went about implementing a statistical process control program.

33 The meaning of SPC at Goodyear

by D.E. Miller, The Goodyear Tire & Rubber Company. This article illustrates how, for an effective SPC program, commitment must begin with top management and spread throughout the manufacturing operations, and discusses how process capabilities are being assessed and how SPC techniques are being employed to improve them at Goodyear.

38 The use of bonded elastomers for energy and motion control in construction

by J.H. Bucksbee, Lord Corp. For applications of energy and motion control in construction, elastomers are used either in shear, compression, tension, torsion and/or buckling. This article discusses some of these uses.

53 Patent News

edited by Bob Samples, Akron Rubber Development

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New equipment, instruments, products and materials

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Cover

Cover photo courtesy of Pennwalt.

A Lippincott & Peto Publication

Business Briefs

Acquisitions, expansions

Armtek Corp.(formerly Armstrong Rubber) sold its Natchez, MS tire manufacturing plant and its S&A Truck Tire Sales and Service Corp. to **Condere Corp.**, New Haven, CT. The Natchez facility will continue to supply truck tires to Armstrong Tire and a certain percentage of the Sears Truck Tire Centers product line. S&A, through a license agreement with Sears, operates 51 retail outlets under the STTC name. Armtek also sold its Industrial Tire and Assembly division, including a production facility in Clinton, TN to **Dyneer Corp.**, Scotsdale, AZ.

Cooper Tire is undergoing a multimillion dollar expansion which will boost radial and light truck tire production at its Texarkana, AR plant by 25%; add equipment to its Tupelo, MS that will increase production by 30% and a 10% production increase at its Findlay plant.

VMI Americas, Inc. is constructing offices and manufacturing facilities near Akron, OH for its automated systems and machinery to assemble tires, produce tire components or to process rubber.

Helvoet Pharma, Pennsauken, NJ purchased certain assets relating to the manufacture and distribution of pharmaceutical grade compression molded parts and infant feeding nipples from **J.P. Stevens & Co.**

Wacker Chemical Co., Louisville, KY is purchasing **Stauffer Chemical's** interest in Stauffer-Wacker Silicones Corp., Adrian MI.

Mohawk Rubber added a 160,000 ton Banbury to its Tread Rubber Division in Guntersville, AL.

American Feed Screws has been established in Akron and will provide screw design programs for extruder and injection molding machines and feed screw and barrel manufacture and repair.

Thunderline Corp. is adding 22,000 sq. ft. to its Bellville, IL silicone molding facility.

Ashland Chemical is increasing maleic anhydride production capacity at its Neal, WV plant by 40%.

Carlisle SynTec Systems acquired **Hardcast, Inc.**, Wylie, TX a manufacturer and marketer of adhesives, sealants and tapes.

Goodyear will market aviation tires worldwide through a department based in Akron. Establishment of the Aviation Products Dept. follows the sale of Goodyear Aerospace which didn't include Goodyear's aircraft tire operations or the Air Treads retreading and wheel and brake overhaul unit based in Atlanta, GA.

Contracts, licenses

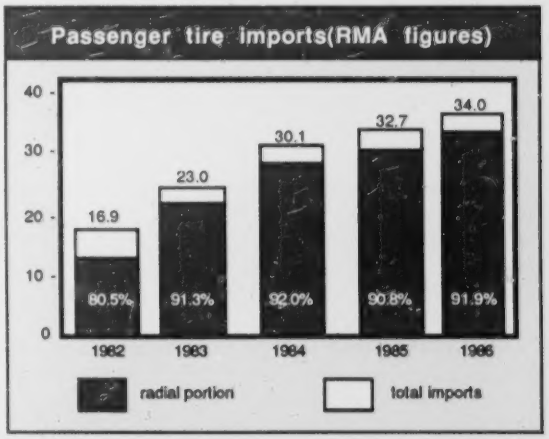
Du Pont named **R.T. Vanderbilt Inc.**, Norwalk, CT a full stocking distributor of its neoprene and Nordel elastomers and Hypalon chlorosulfonated polyethylene.

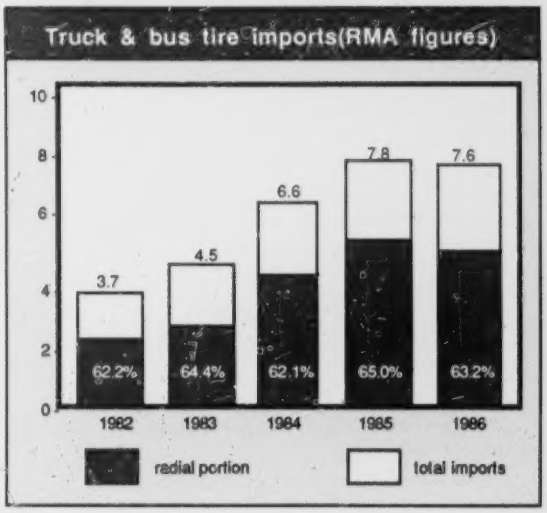
Teijin Ltd. and **Ethyl Corp.** have begun an exclusive cooperative development program to explore the potential of polyphosphazene polymers in fiber applications. Ethyl will utilize its proprietary synthesis technology, and Teijin will contribute expertise in fiber production and marketing.

Rubber Research Elastomerics entered into a license agreement with **Rubbertech, Inc.**, a Minnesota corporation for the use of technology developed by RRE for the manufacture of rubber roofing components out of Tirecycle compounds, a newly developed recyclable rubber product.

Clevite Industries, Glenview, IL and **Bridgestone Corp.**, Tokyo have formed a joint venture to be named Clevite-Bridgestone Co. Headquartered in Milan, OH, the company will manufacture and sell rubber-to-metal products for the automotive industry. Initially the company will manufacture in Clevite's existing Angola, IN plant. If sales justify, production will relocate to a new or purchased plant.

Hysol Aerospace, Pittsburg, CA is licensing its en-





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RubberWorld

Trends in tire, vehicle development

Study of cured tire heat build-up

Tire design engineering

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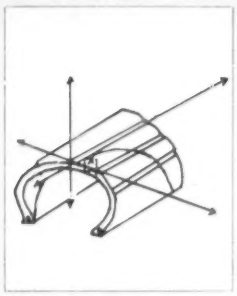

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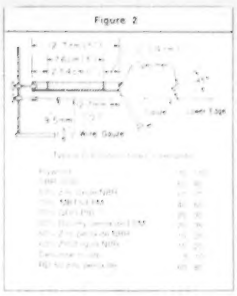

Safer zinc peroxide p. 36

6 Business Briefs

Acquisitions, expansions; contracts, licenses; financial statements; markets, news.

8 Tech Service: A vanishing issue

by Jon Menough, contributing technical service editor. This month's column looks at factors affecting rubber shrinkage, including temperature, the base elastomer, the filler system used, the cure system used, the effect of grain, physical restraints on the product, and what the mold or other forming surface is made of.

10 Urethane Forum: SPI programs aid current industry progress

A review of the Society of the Polyurethane Industry's Polyurethane Division's program of diversified activities in support of the industry's growth objectives, including technical and market research, testing, education and promotion efforts.

14 Quality Management: Measurement accuracy

by Robert A. Dovich, American Technologies, Inc. This column focuses on the measurement process that is used to determine process capability, specifically the long and short methods of gage repeatability and reproducibility analysis.

18 Trends in the development of tires and vehicles

by L.F. Henry and L.S. Stokes, Uniroyal Goodrich Tire Co. A look at the development of the tire and automotive industries, and how computer technologies have dramatically shortened the design cycle.

26 CAD/CAE: A look at tire design engineering

by K.F. Sarver, Firestone Tire and Rubber Co. This article focuses on the areas of CAD/CAE which support the tire development process, with particular emphasis on radial passenger and light truck tires.

30 Study of heat build-up of a cured tire using a Goodrich Flexometer

by S.K. Chakraborty and D.P. Mukherjee, J.K. Industries, Ltd., India. In addition to presenting a study of a cured tire tested in the Goodrich Flexometer for its relative heat build-up, this article offers a comparative study of different types of tires.

36 Safer zinc peroxide dispersions

by Richard F. Grossman and Frank W. McKane Jr., Synthetic Products Co. Applications where zinc oxide can be used successfully as a delayed action crosslinking agent for carboxylated NBR compounds are presented in this article, as well as applications where various retarded grades of zinc oxide or zinc oxide dispersions are appropriate.

38 Patent News

edited by Bob Samples, Akron Rubber Development

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Cover photo courtesy of Uniroyal Goodrich Tire Co.

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Business Briefs

Acquisitions, expansions

Polysar is buidling a hydrogenated nitrile rubber plant in Orange, TX to be completed by the fall of 1988 and will have an annual capacity of 3.5 million pounds.

Dunlop is undergoing a $44 million capital expenditure program for modernization of its radial tire production facilities in Huntsville, AL that will raise the production level to 25,000 tires per day when completed in May of 1988.

RMA rubber report through February
(figures in metric tons)

	Cumulative 1987	Cumulative 1986	%
Total new rubber			
New rubber available	554,858	502,322	10.46
Imports	190,277	181,328	4.94
Exports	77,011	62,324	23.57
Apparent consumption	464,238	438,081	5.97
Total natural rubber			
Imports	144,070	140,222	2.74
Exports	6,884	7,220	4.65
Apparent consumption	135,319	131,263	8.42
%total new rubber	29.14	29.96	
Total synthetic rubber			
Production	364,581	320,994	13.58
Imports	46,207	41,106	12.41
Exports	70,127	55,106	27.26
Apparent consumption	328,918	306,817	7.20
Total SBR			
Production	139,168	123,940	12,29
Imports	13,944	15,023	-7.18
Exports	26,543	15,549	70.71
Apparent consumption	126,127	126,316	-.15
Total nitrile			
Production	11,395	9,375	21.55
Imports	2,058	1,844	11.61
Exports	1,770	1,877	-6.20
Apparent consumption	10,643	10,149	4.87
Polybutadiene			
Production	61,271	59,948	2.21
Imports	14,049	8,491	65.46
Exports	10,922	5,032	117.05
Apparent consumption	62,110	58,994	5.28
Ethylene-propylene			
Production	44,174	33,803	30.68
Imports	888	627	41.64
Exports	7,500	6,795	10.38
Apparent consumption	33,060	29,402	12.44
Butyl, polychloroprene, polyisoprene, silicone and other synthetic elastomers			
Production	108,573	93,927	15.59
Imports	15,268	15,121	.97
Exports	23,392	25,641	-9.48
Apparent consumption	96,976	81,954	18.33

Dow Corning opened its $12 million technical development and service facility dedicated to its specialty elastomers business in Midland, MI.

Armtek Corp. finalized the sale of its industrial tire and assembly business division to a subsidiary of **Dyneer Corp.** The agreement covers Armtek's tire production facility in Clinton, TN along with assembly and distribution facilities currently serving the OE and replacementmarkets.

Firestone has withdrawn its closure notice for its Des Moines, IA farm tire plant and will consolidate commercial tire manufacturing at the plant, resulting in the addition of up to 300 new jobs. Firestone also announced it completely divested itself of its South African subsidiary.

Goodyear sold all the shares of its tire manufacturing subsidiary in Kinshasa, Zaire to the **African Holding Co. of America**, a New Jersey corporation.

Lord Corp. acquired full ownership of **Lord-Metzler Automotive Inc.**, a company established as a 50/50 joint venture with **Metzeler Kautschuk** of Munich, West Germany.

Arco Chemical is starting up its idle styrene plant in Beaver Valley, PA to be operational in October. At the same time the company will expand ethylbenzene production at its Channelview, TX plant to meet feedstock requirements for Beaver Valley and the company announced it was opening styrene monomer supply terminals in New Haven, CT and Perth Amboy, NJ.

Emery Chemicals will open a European sales office at Breda in The Netherlands.

Killion Extruders has a new 30,000 sq. ft. building in Cedar Grove, NJ which consolidated its New Jersey manufacturing plant and extrusion equipment laboratory.

Carlisle Syntec Systems opened a regional office and distribution center in Kansas City, KS and one in Denver, CO.

Exxon Chemical will build a methyl ethyl ketone plant, initially manufacturing 230 million pounds annually upon completion in 1988 at its chemical plant in Baton Rouge, LA.

Du Pont is selling its high density polyethylene business and supporting ethylene facilities for $247 million to **Cain Chemical Inc.** of Houston, TX.

Lonza Inc. expanded acetoacet arylamides capacity at its Bayport, TX facility.

Fusion Systems, Rockville, MD acquired the business of **Energy Sciences Inc.**, Woburn, MA a manufacturer of electron beam equipment.

Wacker Chemical purchased the shares held by **Stauffer Chemical** in **Stauffer-Wacker Silicones Corp.**, Adrian, MI.

Contracts, licenses

3M is the exclusive distributor of **Asahi Glass'** Aflas fluoroelastomers in North America and western

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RubberWorld

The technical service magazine for the rubber industry

Volume 196, No. 4

July 1987

Annual Machinery & Equipment Issue

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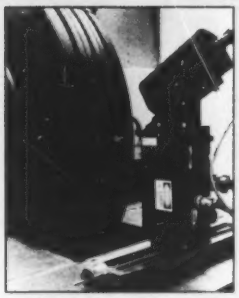
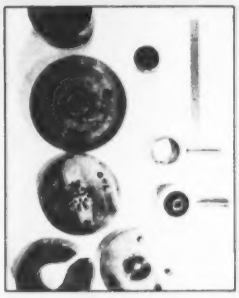


Laser triangulation p. 25



Molding technology p. 29

6 Business Briefs

Acquisitions, expansions; contracts, licenses; financial statements; markets, news.

8 Tech Service: Thickness anyone?

by Jon Menough, contributing technical service editor. This month's column looks at a line of thickness measuring devices based on gamma backscatter, developed by NDC Systems of Monrovia, CA, for use on calendered products.

10 Quality Management: Computerized gage control systems

by Paul Hertzler, Paul Hertzler & Co. This column presents an analysis of computer systems for controlling gages, as a prerequisite to statistical process control.

14 Urethane Forum: New solvent recovery technology helps meet EPA emissions mandate

by A.J. Ehrler, The Celicote Co. A solvent recovery process system is presented. Used in combination with the radically-advanced "Sol-Vol-X" absorbent, it is said to meet objectives in terms of providing a cost-effective, flexible and completely automatic alternative to other volatile organic compound (VOC) removal technologies.

16 Technological benefits through process control

by K. Guenther Heiss, Werner & Pfleiderer Corp. This article provides a perspective on the successful operation of rubber injection molding. The discussion includes the process itself, equipment, control systems and development areas.

20 Processing melt processible rubbers

by W. Robert Abell, III, E.I. du Pont de Nemours & Co. The author discusses the ways in which MPR combines the performance properties of mid-performance rubbers with a processing latitude that is said to be unmatched by other rubbers.

25 Non-contact laser triangulation for tire industry automation process control

by Stephen F. Turco, Selective Electronics, Inc. The extrusion of tire treads, and other critical areas, is becoming a science based on the positive use of automation control, as described in this article.

29 Molding technology and a computer program for molding simulations

by Henry S.-Y. Hsich and R.J. Ambrose, Lord Corp. The authors have developed a computer program for molding simulations through the applications of rheology and cure kinetics to elastomer molding operations.

38 Survey of instrumentation and test equipment suppliers and rubber machinery suppliers

40 Used and rebuilt machinery suppliers

Directory of second-hand rubber processing equipment along with a grid showing rebuilding capabilities.

45 Instrumentation and test equipment suppliers

Directory of instrumentation and testing equipment suppliers to the rubber industry.

57 Corporate Profile '87

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Business Briefs

Acquisitions, expansions

Continental AG, Hanover, West Germany will buy the **General Tire** subsidiary from **GenCorp** for $650 million. General Tire also announced that recently completed capital improvements programs have increased radial passenger tire production at its Charlotte, NC plant 24% daily, an 11% increase at the Mt. Vernon, IL plant and a 15% increase at its Mayfield, KY plant.

Dunlop Tire will spend $21.1 million to modernize its Sheridan Drive tire plant in Tonawanda, NY increasing daily capacity 67%.

The Steelastic Co., Akron, OH signed letters of intent to purchase the **Tire Equipment Inc.** and **Salisbury** machine subsidiaries of Goodyear.

Goodyear's subsidiary **Long Mile Rubber** will build a plant to produce single-piece, injection-molded treads for commercial truck tires at an undetermined site, but with production scheduled to begin in 1988. Goodyear plans to have its $15 million radial aircraft tire facility in operation by early 1988 at its Danville, VA facility.

Polysar has begun production of powdered nitrile rubber at a new unit added to its Polysar France complex in Strasbourg.

SCM Chemicals is expanding its Bunbury titanium dioxide operations from 40,000 tons per year to 77,000 tons, at a cost of more than $150 million (Australian).

Witco Corp. acquired **U. S. Emulsifiers,** Memphis, TN for approximately $5.3 million.

The Fluorocarbon Co., Laguna Nigel, CA acquired **Eaton Corp.'s** polymer products division and renamed the Aurora, OH operation **The Samuel Moore Group.**

Allied Fibers is expanding industrial polyester fiber capacity at its Moncure, NC facility by 25%.

Ashland Chemical signed a letter of intent to purchase **Southern Petrochemical, Inc.,** a privately held Atlanta-based distributor of bulk thermoplastic resins.

Imperial Adhesives, Cincinnati, OH acquired the assets of **Audal, Inc.**

Dowty Group, PLC agreed to acquire **Woodville Polymer Engineering Ltd.**(U.K.), whose technology includes polymer engineering, insulation foams and coated and fabricated products.

Glenro, Inc., Patterson, NJ has started a new convection oven division.

M.A. Hanna Co. purchased **Allied Color Industries,** Broadview Heights, OH a manufacturer of colorants.

Arco Chemical acquired the exclusive worldwide rights to the methyl methacrylate (MMA) technology of the **Halcon SD Group.**

Polyvinyl Chemicals has established a Canadian subsidiary for sales and distribution of its acrylic and urethane

RMA tire report through March
(figures in thousands of units)

Passenger tires	YTD '87	YTD '86	%change
Shipments			
original equipment	15,048	14,589	3.15
radial	12,739	12,233	4.14
replacement	32,093	30,739	4.40
radial	28,455	26,341	8.03
export	1,285	1,034	24.27
radial	1,106	785	40.89
total	48,426	46,362	4.45
radial	42,300	39,359	7.47
Production	42,614	40,988	3.97
radial	36,882	34,448	7.07
Truck & bus tires			
Shipments			
original equipment	1,946	1,766	10.19
radial	1,371	1,166	17.58
replacement	7,465	6,904	8.13
radial	3,874	3,184	21.67
export	447	338	32.25
radial	317	203	56.16
total	9,858	9,008	9.44
radial	5,562	4,553	22.16
Production	8,590	8,251	4.11
radial	4,600	3,925	17.20

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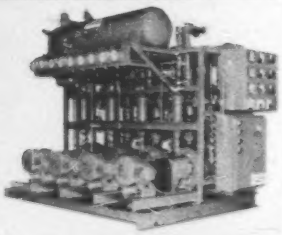

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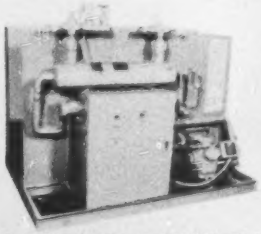

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special-purpose polymers.

Contracts, licenses

Acushnet Co. plans to open a manufacturing and distribution subsidiary in Thailand as part of a joint venture with **Minor Holding Ltd.**. A 10,000 sq. ft. complete rubber processing facility will be built near Bangkok.

The Dutch chemical group **DSM** and **Idemitsu Petrochemical** of Japan are examining joint ventures for EPDM rubber for the Far East and polycarbonate for Europe. For EPDM, the two companies are considering constructing a 30,000 ton plant, based on DSM technology, in Japan, to be commissioned in 1990. For polycarbonate, a 25,000 ton plant, based on Idemitsu technology, would be constructed in Europe with a 1990 start-up as well.

MKB Industries, Stratford, CT is the U.S. marketing and engineering distributor for **Iddon Brothers LTD,** Leyland, England, manufacturers of computer managed extrusion equipment.

The M.F. Cachat Co., Cleveland, OH is now a distributor of **New Jersey Zinc**(zinc oxide and zinc dust), **NJZ Colors**(chrome yellow and moly orange), **SCM Chemicals**(titanium dioxide) and **Occidental Chemical**(chlorinated paraffins).

Neochem, Akron, OH has been appointed by **Peter Heard and Associates** as a sales representative for its polymers and chemicals.

Summit Chemical, Akron is now a distributor for **Akzo Chemie**.

T.K. Fielders Co. appointed **U.S. Extrusion** as its exclusive North American representative for its blending plants and mixers.

Eastman Kodak issued a license to **Sunkyong Fibres**, Seoul, South Korea to manufacture dimethyl terephthalate(DMT) and terephthalic acid(TPA) using Eastman technology.

RMA rubber report through March
(figures in metric tons)

	Cumulative 1987	Cumulative 1986	%
Total new rubber			
New rubber available	855,142	792,594	7.89
Imports	297,001	288,847	2.82
Exports	120,147	90,895	32.18
Apparent consumption	728,206	685,391	6.25
Total natural rubber			
Imports	226,662	218,073	3.94
Exports	9,429	10,289	-8.36
Apparent consumption	216,502	202,529	6.90
%total new rubber	29.73	29.54	
Total synthetic rubber			
Production	558,141	503,747	10.80
Imports	70,339	70,774	-.61
Exports	110,718	80,606	37.36
Apparent consumption	511,703	482,861	5.97
Total SBR			
Production	216,090	192,045	12.52
Imports	20,977	29,308	-28.43
Exports	44,201	21,445	106.11
Apparent consumption	196,516	196,463	.03
Total nitrile			
Production	18,070	15,033	20.20
Imports	3,310	2,856	15.90
Exports	2,906	2,509	15.82
Apparent consumption	16,478	15,843	4.01
Polybutadiene			
Production	94,796	93,547	1.34
Imports	23,114	13,926	65.98
Exports	15,467	5,964	163.76
Apparent consumption	100,425	90,610	10.83
Ethylene-propylene			
Production	66,005	55,560	18.78
Imports	1,544	1,003	53.94
Exports	11,724	11,334	3.44
Apparent consumption	51,912	48,185	7.73
Butyl, polychloroprene, polyisoprene, silicone and other synthetic elastomers			
Production	163,179	147,553	10.59
Imports	21,394	23,681	-9.65
Exports	36,420	39,454	-7.69
Apparent consumption	146,372	131,760	11.09

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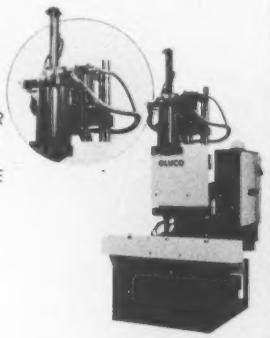

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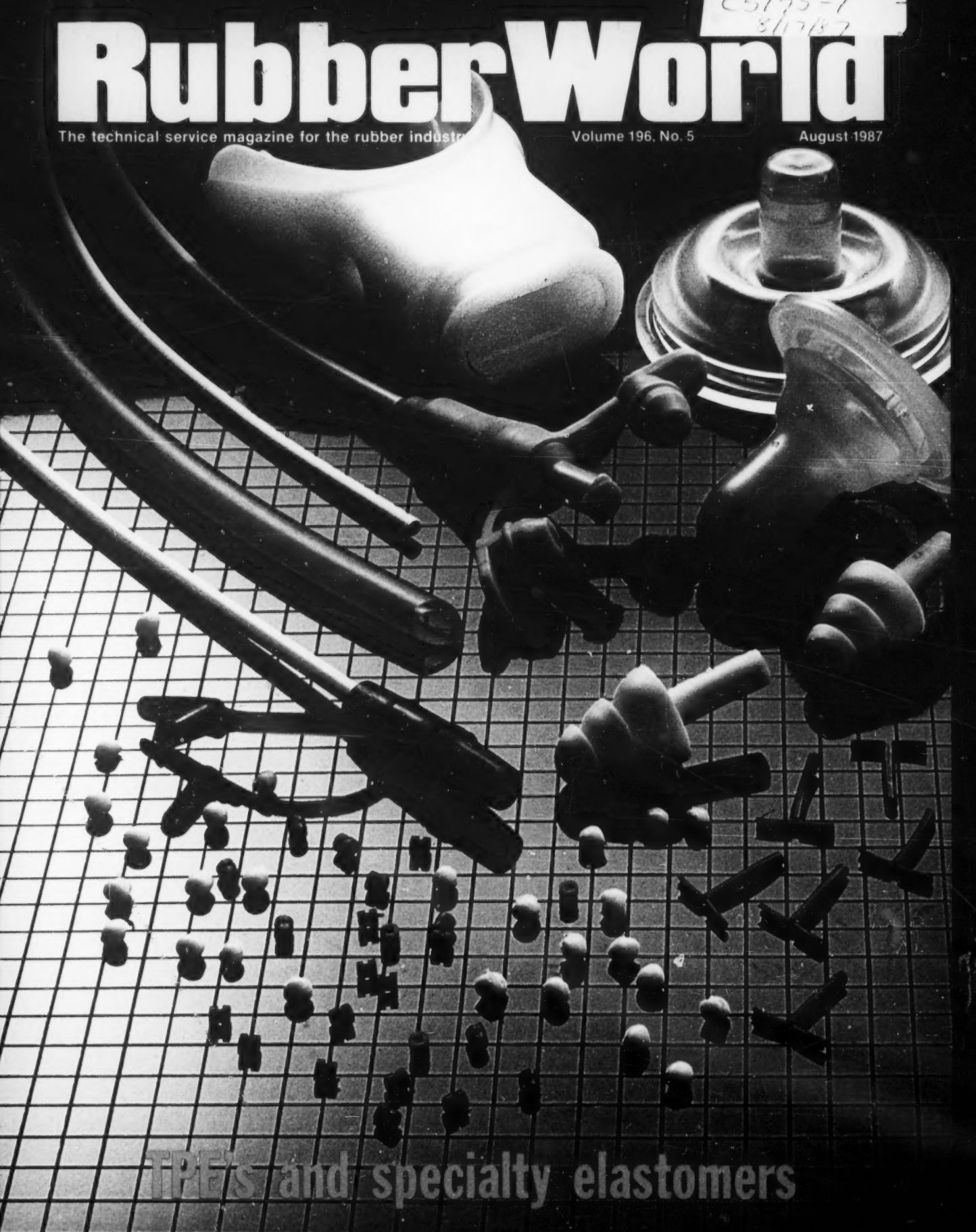
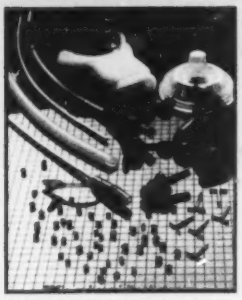
The technical service magazine for the rubber industr

Volume 196, No. 5

August 1987



TPEs and specialty elastomers



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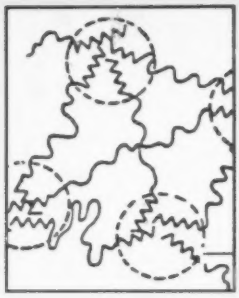

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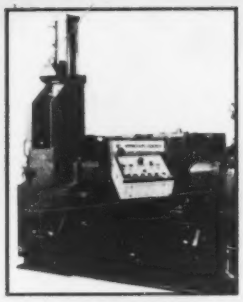

Techno Mart p. 44

5 Business Briefs
Acquisitions, expansions; contracts, licenses; financial statements; markets, news.

8 Tech Service: Getting rid of unwanted material
by Jon Menough, contributing technical service editor. This month's column looks at RapidPurge, a chemically acting purging compound which is reported to break down the molecular structure of residual thermoplastic resin left in the processing machine or tool.

10 Urethane Forum: World Congress will feature 162 papers
Papers by authors from 12 countries to be featured at the Polyurethane World Congress 1987 when it convenes September 29 in Aachen, West Germany are highlighted in this month's column.

18 Styrenic thermoplastic elastomers
by G. Holden, Shell Development Co. The author, a substantial scientific contributor to the field of styrenic TPEs from its beginning, puts 25 years of spectacular growth in perspective.

24 New silicone modified TPEs for medical applications
by Richard Deisler and Ed Perrin, Concept Polymer Technologies, Inc. This article describes an important development in thermoplastic elastomers wherein polyvinyl siloxane polymers are blended to obtain unique properties for medical applications.

27 Compounding and applications of ENR
by C.S.L. Baker and I.R. Gelling, Malaysian Rubber Producers' Research Association, and Khairil Anuar b Abdullah and M.G. Smith, Kumpulan Guthrie Sendirian Berhad. The authors describe a new and special balance of properties obtainable from epoxidizing natural rubber.

32 A new class of high performance polysulfide polymers
by Hakam Singh, Products Research & Chemical Corp. Chemical modification of liquid polysulfide polymers has created a new class of hybrids which exhibit many properties superior to their precursors.

44 Techno Mart
New equipment, instruments, CAD/CAM, products and materials

51 Patent News
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Cover photo courtesy of Concept Polymer Technologies, Inc.

A Lippincott & Peto Publication

Business Briefs

Adhesives Consultants, Hayward, CA will distribute **Henkel Polymers'** line of high performance thermoplastic polyamides.

Arco Chemical is forming a joint venture in Indonesia with **P.T. Gema Supra Abadi** to manufacture and market polyether polyols. A 44 million pound per year plant will be constructed on the island of Java.

The Mearl Corp., New York, NY has added **C.L. McGuire Co.**, Louisville, KY and **I.T. Bauman Co.**, St. Louis, MO as representatives for its pigments and colors.

BFGoodrich received a $2 million contract from the **U.S. Air Force** to supply surge boots used in the refueling booms of tanker aircraft.

RTP Co., Winona, MN, named the **Plastic Service Centers** as a representative for its reinforced and specialty modified thermoplastics.

RMA rubber report through April (figures expressed in metric tons)

	YTD 1987	YTD 1986	% change
Total new rubber			
New rubber available	1,122,901	1,071,372	4.81
Imports	390,688	394,650	-1.00
Exports	163,388	132,288	23.51
Apparent consumption	950,163	916,945	3.62
Total natural rubber			
Imports	295,954	302,524	-2.17
Exports	12,287	14,635	-16.04
Apparent consumption	278,919	284,472	-1.95
%total new rubber	29.35	31.02	
Total synthetic rubber			
Production	732,213	676,722	8.20
Imports	94,734	92,126	2.83
Exports	151,101	117,653	28.43
Apparent consumption	671,243	632,472	6.13
Total SBR			
Production	284,958	259,299	9.90
Imports	28.004	37,204	-24.73
Exports	58,508	30,716	90.48
Apparent consumption	259,829	258,966	.33
Total nitrile			
Production	23,674	20,301	16.61
Imports	4,586	3,832	19.68
Exports	4,158	3,185	30.55
Apparent consumption	22,493	21,652	3.88
Polybutadiene			
Production	124,780	122,777	1.63
Imports	30,043	18,345	63.77
Exports	21,066	8,478	148.48
Apparent consumption	131,375	119,796	9.67
Ethylene-propylene			
Production	87,003	76,298	14.03
Imports	2,203	1,511	45.80
Exports	15,933	15,891	.26
Apparent consumption	68,513	62,044	10.43
Butyl, polychloroprene, polyisoprene, silicone and other synthetic elastomers			
Production	211,798	198,048	6.94
Imports	29,898	31,234	-4.28
Exports	51,436	59,383	-13.38
Apparent consumption	189,034	170,016	11.19

Financial statements

Armtek Corp. had a net income of $6.7 million for the third quarter on sales of $316.7 million.

Bridgestone reported 1986 net earnings of $379.9 million on sales of $4.9 billion

Carlisle Companies reported second quarter net earnings of $5 million on sales of $138 million.

Cooper Tire & Rubber had a second quarter net income of $7.3 million on sales of $164.3 million.

Eagle-Picher reported second quarter net income of $10.5 million on sales of $173.5 million.

Essex Chemical had a second quarter net income of $1.6 million on sales of $59.5 million.

GenCorp reported second quarter net income of $187 million on sales of $450 million.

BFGoodrich reported second quarter net income of $38.3 million on sales of $551.1 million.

Goodyear's net income for the second quarter was $141 million on sales of $2.56 billion.

M.A. Hanna Co. reported second quarter net income of $8.9 million on sales of $55.3 million.

RMA tire report through April (figures in thousands of units)

Passenger tires	YTD '87	YTD '86	% change
Shipments			
original equipment	19,747	19,419	1.69
radial	16,695	16,248	2.75
replacement	44,295	42,649	3.86
radial	39,250	36,460	7.65
export	1,712	1,366	25.33
radial	1,486	1,052	41.25
total	65,754	63,434	3.66
radial	57,431	53,760	6.83
Production	56,525	54,483	3.75
radial	48,973	45,865	6.78
Truck & bus tires			
Shipments			
original equipment	2,654	2,394	10.86
radial	1,867	1,583	17.94
replacement	10,295	9,523	8.11
radial	5,386	4,473	20.41
export	610	463	31.75
radial	426	281	51.60
total	13,559	12,380	9.52
radial	7,679	6,337	21.18
Production	11,359	10,792	5.25
radial	6,121	5,175	18.28

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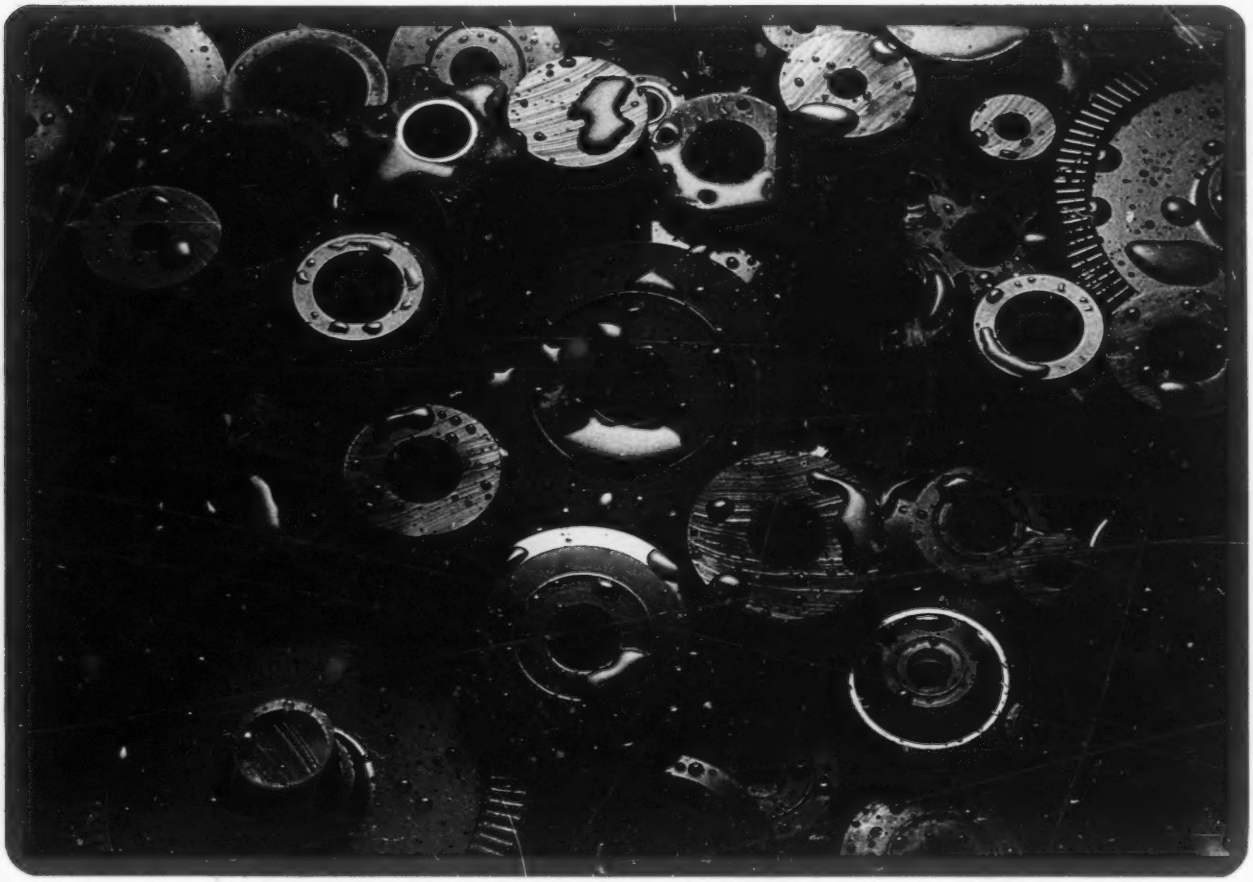
RubberWorld

The technical service magazine for the rubber industry

Volume 196, No. 6 September 1987



What polyurethane? Where?

The effects of crosslinking on the dynamic mechanical properties of urethanes

Comparisons of methods of state-of-cure determination

Compounding ingredients price list

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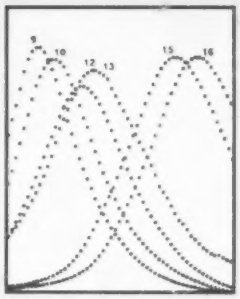

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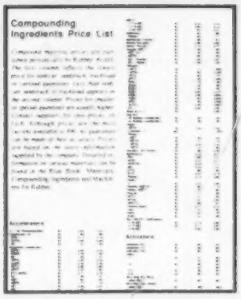

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5 Business Briefs
Acquisitions, expansions; contracts, licenses; financial statements; markets, news.

12 Tech Service: A network for control
by Jon Menough, contributing technical service editor. This month's column looks at REP-NET, a system developed to monitor critical processes from several pieces of equipment at one time and provide accurate information in SPC formats on these processes.

15 Urethane Forum: Thermoplastic polyurethane/rubber
by Costas Georgacopoulos, Dow Chemical. This article reviews blends of the thermoplastic SIS/SBS rubbers with thermoplastic polyurethanes and discusses property improvements and applications.

21 What polyurethane? Where?
by Dr. Ronald W. Fuest, Uniroyal Chemical Company. The author presents a macro guideline to the types of PU elastomers that are available, the kinds of physical and environmental resistance properties they have, and the typical applications that each will fulfill.

27 The effects of crosslinking on the dynamic mechanical properties of urethanes
by Walter M. Madigosky, Naval Surface Weapons Center, Silver Spring, MD. This article examines such dynamic properties as tensile modulus, the loss tangent and the glass-rubber transition.

30 Comparison of methods of state-of-cure determination
by R.L. Warley and R.J. Del Vecchio, Lord Corp. The authors explore methods proposed as state-of-cure measurements, such as physical property testing, differential scanning calorimetry, solvent swell and Mooney-Rivlin equilibrium modulus.

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Business Briefs

BFGoodrich was awarded a $758,400 contract by the **Army** to supply 3,000-gallon collapsible fabric tanks to haul drinking water.

Financial statements

Ausimont reported second quarter net income of $15.3 million on sales of $191.9 million.

RMA rubber report through May
(figures expressed in metric tons)

	YTD 1987	YTD 1986	% change
Total new rubber			
New rubber available	1,394,622	1,313,058	6.21
Imports	482,613	468,693	2.97
Exports	208,433	162,195	28.51
Apparent consumption	1,176,844	1,126,081	4.51
Total natural rubber			
Imports	360,679	350,928	2.75
Exports	15,089	17,537	-13.96
Apparent consumption	341,526	329,925	3.52
%total new rubber	29.02	29.29	
Total synthetic rubber			
Production	912,009	844,365	8.01
Imports	122,034	117,765	3.63
Exports	193,344	144,658	33.66
Apparent consumption	835,317	796,156	4.92
Total SBR			
Production	354,769	321,315	10.41
Imports	35,942	46,461	-22.64
Exports	74,224	39,571	87.57
Apparent consumption	322,102	320,589	.47
Total nitrile			
Production	29,709	26,784	10.92
Imports	5,785	5,007	15.54
Exports	5,497	4,273	28.64
Apparent consumption	27,855	26,896	3.57
Polybutadiene			
Production	154,653	150,176	2.98
Imports	37,501	24,188	55.04
Exports	27,460	9,607	185.83
Apparent consumption	162.724	151,353	7.51
Ethylene-propylene			
Production	108,083	97,802	10.51
Imports	2,604	1,782	46.13
Exports	20,233	19,449	4.03
Apparent consumption	84,977	79,050	7.50
Butyl, polychloroprene, polyisoprene, silicone and other synthetic elastomers			
Production	264,795	248,288	6.65
Imports	40,202	40,327	-.31
Exports	65,930	71,758	-8.12
Apparent consumption	237,661	218,267	8.89

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Polymer and carbon black die swell

Surface modified kaolins in EPDM

Predispersed rubber chemicals

Multifunctional rubber ingredients

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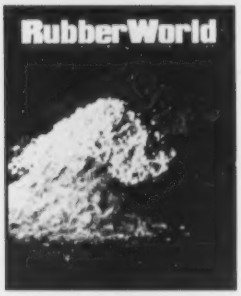

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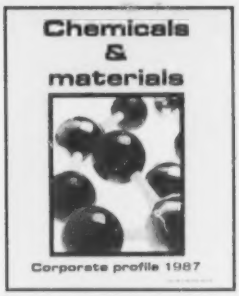

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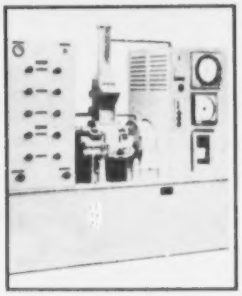

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6 Business Briefs
Acquisitions, expansions; contracts, licenses; financial statements; markets, news.

10 Tech Service: Design basics: Molded goods
by Jon Menough, contributing technical service editor. A look at molded products, specifically how designers need to be aware of the changing characteristics of rubber when designing rubber products.

12 Urethane Forum: PMA, CUMA will hold joint meeting
A review of the Polyurethane Manufacturers Association's and the Canadian Urethane Manufacturers Association's joint meeting, to be held October 17-21 at the Quebec Hilton International.

16 Quality Management: Assessing employees' attitudes on quality
by Scott Montgomery, Technicomp, Inc. When implementing product quality improvements, an organization should first look at the attitudes of its employees towards quality.

18 Die swell response of several polymers and carbon black types
by C.R. Wilder, Phillips Petroleum Co. The author describes a study aimed at improved tire tread extrusion, where the effect on die swell is measured as a function of extruder equipment, operating conditions, type of polymer and type of blacks.

27 Performance of surface modified kaolins in EPDM rubbers
by Frank J. Washabaugh, Engelhard Corp. This article examines the factors important in the use of fine particle size kaolins for power cable, radiator hose and other applications.

33 A review of predispersed rubber chemicals
by A.A. Garnett, K&K-Greeff Limited, U.K. The author systematically describes the many factors involved in preparing successful predispersed rubber chemicals.

37 Preparation/evaluation of multifunctional rubber ingredients
by A.A. Yehia, B.M. Badran and M.N. Ismail, National Research Center, Dokki, Cairo, Egypt. *Military Academy, Helicpolic, Cairo, Egypt.* This article describes innovative compounding ingredients and their multi-functional effect as antioxidants, plasticizers and, to some extent, as accelerators.

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Editorial

EPIC is celebrating its third birthday this month, and this youngster has quickly become one of the top assets of the rubber and polymer industries. EPIC or Edison Polymer Innovation Corporation, is not your typical corporation. The fact is, EPIC is a group of corporations, plus government and two universities. This triumvirate of business, government and academia cooperation, which has long been argued as a necessity for American industry, is working, and all the participants should be proud of the accomplishments to date. EPIC was incorporated to foster innovations through the efforts of member companies, The University of Akron and Case Western Reserve University in Cleveland and the State of Ohio. It originally funded 17 research projects, of which eight have come to fruition, and are ready to be transferred to those member companies interested in further development. Funds are derived from membership fees and grants from the state and used for research at the two universities. EPIC itself does not initiate research on its own, projects are determined through recommendations of an industrial advisory board. It has funded 34 projects to date, including the eight which are now ready to leave the laboratories of the universities. Among the eight are a polymeric wound dressing that incorporates a synthetic monomer agent which induces the growth of new tissue cells to accelerate the healing process, the development of a processibility tester prototype and a membrane viscometer.

Industry was obviously skeptical at the beginning but quickly identified the advantages of being a member. The original membership of 12 northeast Ohio based companies has grown to 53 companies with several multinational corporations. And for some, membership is not cheap. The annual fee for industrial members is determined by the dollar volume of their polymer-related sales. EPIC says some members pay up to $50,000 in annual fees.

This pooled research and development is working and is a smart business decision. Members not only benefit from early access to new technology, but also help determine research projects, recommend content of university sponsored seminars, short-courses and other programs, obtain assistance in the development of specialized training programs plus access to some of the most renowned polymer scientists and engineers at Akron University and CWRU. EPIC claims they are accelerating the innovative process, and it appears in a little under three years they are doing it successfully. And it also appears that industry, government and academia can pool their assets to the benefit of all three.

Don R. Smith

Editor

RubberWorld

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Business Briefs

Roy A. Williams and Wayne R. Andrews, former General Electric materials testing engineers have opened an independent materials testing lab called **Materials Characterization Laboratory** in Schenectady, NY.

USG Industries signed an agreement to purchase **DAP**, Tipp City, OH a producer of caulks, sealants, adhesives and related products.

M.A. Hanna Co. formed a Dayton Polymers Group comprised of the Day International business units recently purchased by Hanna. The units include **Colonial Rubber Works** and **Cadillac Plastic and Chemical.** Hanna also will expand production capacity of its recently acquired **Allied Color Industries**, a producer of colorants and additives.

Arco Chemical Europe will construct a 420,000 metric tons/year methyl tertiary butyl ether unit at its Fossur-Mer plant near Marseille, France. Completion is expected by late 1988.

Spaulding Fibre Co., Tonawanda, NY will purchase all of the equipment and tools of **Synthane-Taylor Co.** that were used to develop and produce high pressure laminated sheet, tube and rod.

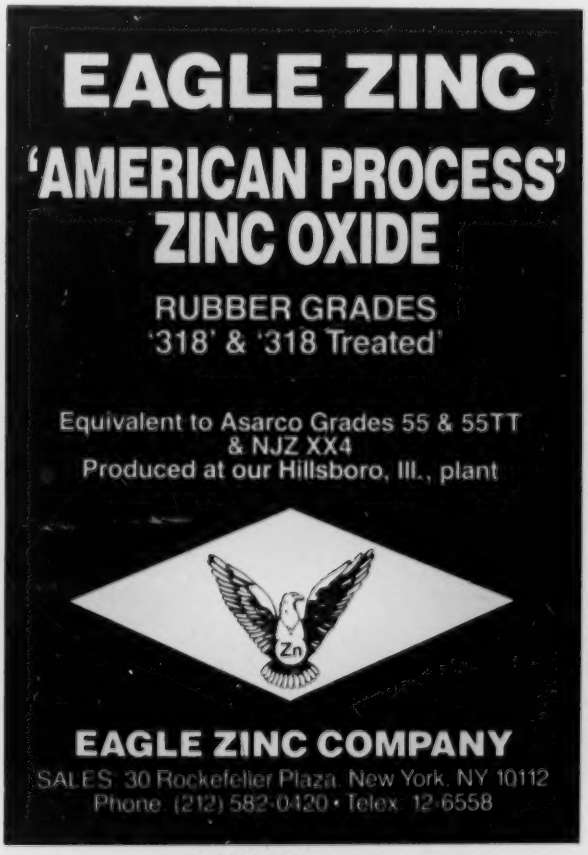
RMA rubber report through June (figures expressed in metric tons)

	YTD 1987	YTD 1986	% change
Total new rubber			
New rubber available	1,650,951	1,543,600	6.95
Imports	563,976	542,101	4.04
Exports	251,200	191,008	31.51
Apparent consumption	1,391,140	1,320,140	5.38
Total natural rubber			
Imports	419,518	405,802	3.38
Exports	17,884	19,839	-9.85
Apparent consumption	397,826	384,482	3.47
%total new rubber	28.59	29.12	
Total synthetic rubber			
Production	1,086,975	1,001,499	8.53
Imports	144,458	136,299	5.99
Exports	233,316	171,169	36.31
Apparent consumption	993,313	935,658	6.16
Total SBR			
Production	421,932	386,138	9.27
Imports	41,289	53,622	-23.00
Exports	89,439	48,669	83.77
Apparent consumption	379,506	380,552	-.27
Total nitrile			
Production	35,732	32,454	10.10
Imports	7,446	6,218	19.75
Exports	6,993	5,146	35.89
Apparent consumption	33,634	32,062	4.90
Polybutadiene			
Production	185,728	177,898	4.40
Imports	44,660	27,331	63.40
Exports	32,772	11,052	196.53
Apparent consumption	196,094	177,544	10.45
Ethylene-propylene			
Production	129,063	117,050	10.26
Imports	3,035	2,264	34.05
Exports	23,881	23,171	3.06
Apparent consumption	102,196	93,850	8.89
Butyl, polychloroprene, polyisoprene, silicone and other synthetic elastomers			
Production	314,519	287,960	9.22
Imports	48,028	46,864	2.48
Exports	80,231	83,131	-3.49
Apparent consumption	281,881	251,651	12.01

Contracts, licenses

Guyson Corp. appointed the **F.A. Ziegler Co.**, Homewood, IL as midwest region representative for its lines of Airless Blast Systems to rubber and plastics processors.

Truflex Rubber Products/Pang Rubber, Los Angeles, CA signed a joint venture with **Taurus Hungarian Rubber Tire Factory** for the manufacture of tire repair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materials which will be available for the Hungarian market as well as for export.

Financial statements

Cabot reported net income for the third quarter was $14.5 million on sales of $319.4 million.

GenCorp reported third quarter net income of $17 million on sales of $416 million.

Markets, news

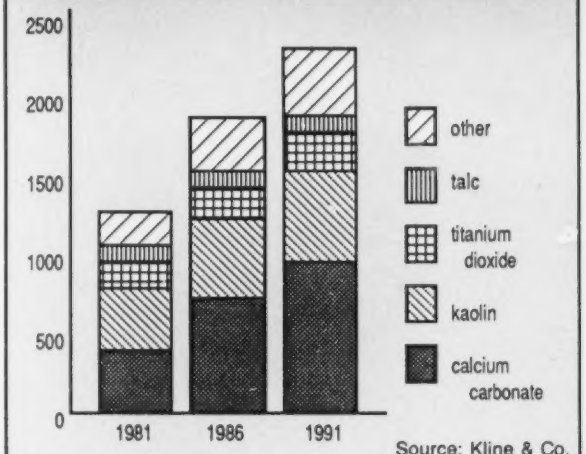
A recent study by Gabris International, Tolland, CT, predicts a 9.5% increase in sales of flexible hose in the U.S. and western Europe through 1991. Total sales were pegged at $2.6 billion dollars for 1986 which should increase to $2.89 billion by 1991. Automotive hose will remain the largest market segment with sales increasing from $940 million to $1 billion, a 6.4% increase followed by industrial hose with a 12.1% increase to $970 million. Usage of raw materials will increase in sales from $540 million to $600 million during the period. No change is expected for the demand of commodity rubber (NBR, neoprene, SBR, EPDM, natural and butyl) as materials of choice but thermoplastic rubber usage is expected to increase over 31% to almost 14,000 metric tons and specialty rubber demand should increase 12% to 30,819 metric tons by 1991. Thermoplastics, the largest material used is expected to increase 5.8% to over 125,000 metric tons.

The fastest growing segment of the U.S. tire industry over the next five years will be truck tire retreading according to research by Smithers Scientific Services, Akron, OH. Smithers says the movement towards all-steel radial truck tires will greatly improve the market for retreads because they can be retreaded several times while traditional bias truck tires are usually retreaded once per casing.

RMA tire report through June (figures in thousands of units)

Passenger tires	YTD '87	YTD '86	% change
Shipments			
original equipment	28,906	29,122	-0.74
radial	24,450	24,400	0.20
replacement	71,215	67,694	5.20
radial	63,362	57,995	9.25
export	2,714	1,859	45.99
radial	2,346	1,402	67.33
total	102,835	98,675	4.22
radial	90,158	83,797	7.59
Production	83,718	79,290	5.58
radial	72,884	66,828	9.06
Truck & bus tires			
Shipments			
original equipment	4,040	3,641	10.96
radial	2,818	2,417	16.59
replacement	16,306	14,933	9.19
radial	8,621	7,064	22.04
export	941	683	37.77
radial	662	420	57.62
total	21,287	19,257	10.54
radial	12,101	9,901	22.22
Production	17,696	15,636	13.17
radial	10,032	7,522	33.37

North American sales of extender and filler minerals in rubber and plastics



Source: Kline & Co.

Elastomer, plastic hose material demand

Material type	1986 demand (metric tons)	1991 forecast (metric tons)	Growth
Commodity rubber	102,442	103,142	NC
Specialty rubber	27,481	30,819	12.0%
Thermoplastic rubber	10,630	13,970	31.4%
Thermoplastics	118,300	125,160	5.8%
Total	258,853	273,091	5.5%

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